Thesis submitted for the degree of Ph. D. of Agra University.

LAND UTILIZATION
IN
KANPUR DISTRICT

Under the supervision of
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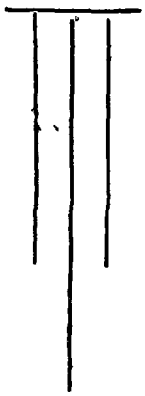

1962

Vidya Bandhu Tripathi
M. A.

PREFACE

The present work is an attempt to study and interpret land utilization in selected villages in the district of Kanpur by recording actual land use and crop distributions on the maps. It further attempts to deal with the occupational structure of the population, per capita total cultivated land, the present and futur potential productive capacity of land and finally the caloric int per head per day computed on the basis of net food supply.

The work falls into three parts, The first deals with the physical setting of the Kanpur district and consists of three chapters, namely structure and relief, climate and soils. The secon part is entirely based on field inquiry and deals with the land utilization and pressure of population in fourteen selected villages in the district for the year 1960-61. This part consists of six chapters. Chapter IV deals with the selection of villages, chapter V gives an account of land utilization and population in four villages located in the well-drained areas of the district. Chapter VI deals with four villages situated in ill-drained areas of the lowland, chapter VII takes an account of three villages lying in the Kachhar of the rivers Ganga and Yamuna, chapter VIII studies two villages lying in the precarious tracts of bhur of the rivers Isan and Ganga and chapter IX is concerned with a village situated in the Yamuna upland region with kabar soil. Part third contains

conclusions drawn from the results of the land utilization survey.

The Writer had to conduct an intensive land use survey of fourteen selected villages which are typical of their regions differentiated on the basis of soil types, availability of water for irrigation and varied range of crops. He inspected the fields on the spot in the two agricultural seasons of kharif and rabi and collected information regarding the per acre yield, rotation of crops, tillage practices and manuring problems etc., from the cultivators personally. Outline maps of these villages with field boundaries and their areas were obtained from the authorities of the Revenue Department of the different Tahsils and the headquarters of the district, and climatic data for the last thirty years from the Director, Meteorological Department Government of India, New Delhi, to whom the writer is extremely indebted. The writer has utilized published books, reports and articles available to him.

I wish to express my heartfelt gratitude to Dr. M. Shafi, M.A.Ph.D.(London), Head of the Geography Department, Muslim University, Aligarh, under whose valuable and inspiring guidance, this work has been prepared. Being an eminent scholar himself he has always been a beacon light to me during my research work. He has been more than a supervisor to me. I would like to express my sincere thanks to my honourable teacher Dr. S.N. Mehrotra, Principal, Government Degree College, Jagdalpur (M.P.) for his valuable

suggestions. Thanks are due to the Librarians of Govt. Agriculture College, and V.S.S.D. College, Kanpur for their help. I wish to convey my thanks to my colleagues especially Prof. L.K.S.Choudhry and Dr. S.D. Tripathi, who inspired me from time to time to take up this arduous task. I am also thankful to Sri Shiva Mohan Gupta, who typed the manuscripts.

V.S.S.D. College,
Kanpur
15th August, 1962.

Vidya Bandhu Tripathi
Vidya Bandhu Tripathi

C O N T E N T S

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INTRODUCTION

Land may be described as the nation's ultimate asset and the land use plays a very important role in the development of national economy. It is upon the use or misuse of land and its potential productive capacity that the economic prosperity of a nation depends in general and of an agrarian economy like India in particular. Characterized with its primitive and antiquated means of cultivation, small land holdings, rapid growing population, low agricultural productivity etc., India is facing an ever-increasing pressure of population upon land, which poses serious problems before her. Under these circumstances, planning of land-use is the only solution of multipronged agroeconomic and socio-economic problems.

Land-use planning, on a national scale is complicated and a huge task. It would be improper and inadvisable to suggest some single suitable plan, which can be applicable on a national scale owing to the differences in physical, environment between one region and the other. It is, therefore, essential that a plan for agricultural improvements should ultimately be based on carefully prepared local surveys. Taking this fact into consideration, the Writer has taken up the study of land utilization of selected villages of Kanpur district.

The district of Kanpur lies in the north-west corner of the Allahabad Division of Uttar Pradesh and is situated in the most fertile lower section of the Ganga-Yamuna doab. The district is an irregular quadrilateral in shape with three sides between sixty and seventy, and the fourth about thirty miles long and stretches, between $25^{0}26'$N and 26^{0} 58'N latitudes and $79^{0}31'$E and $80^{0}34'$E longitudes. The greatest breadth from north to south is about seventy miles and the extreme length from east to west is about sixty four miles. The total area of the district is 2361 sq. miles.

The Ganga forms the north-eastern side of the district, beyond which lie the Hardoi and Unnao districts of the Lucknow Division of Uttar Pradesh; while its southern boundary is formed by the river Yamuna, which separates the district from the Jalaun and Hamirpur districts of the Jhansi Division of the state of Uttar Pradesh. It is also bounded by the districts of Etawah

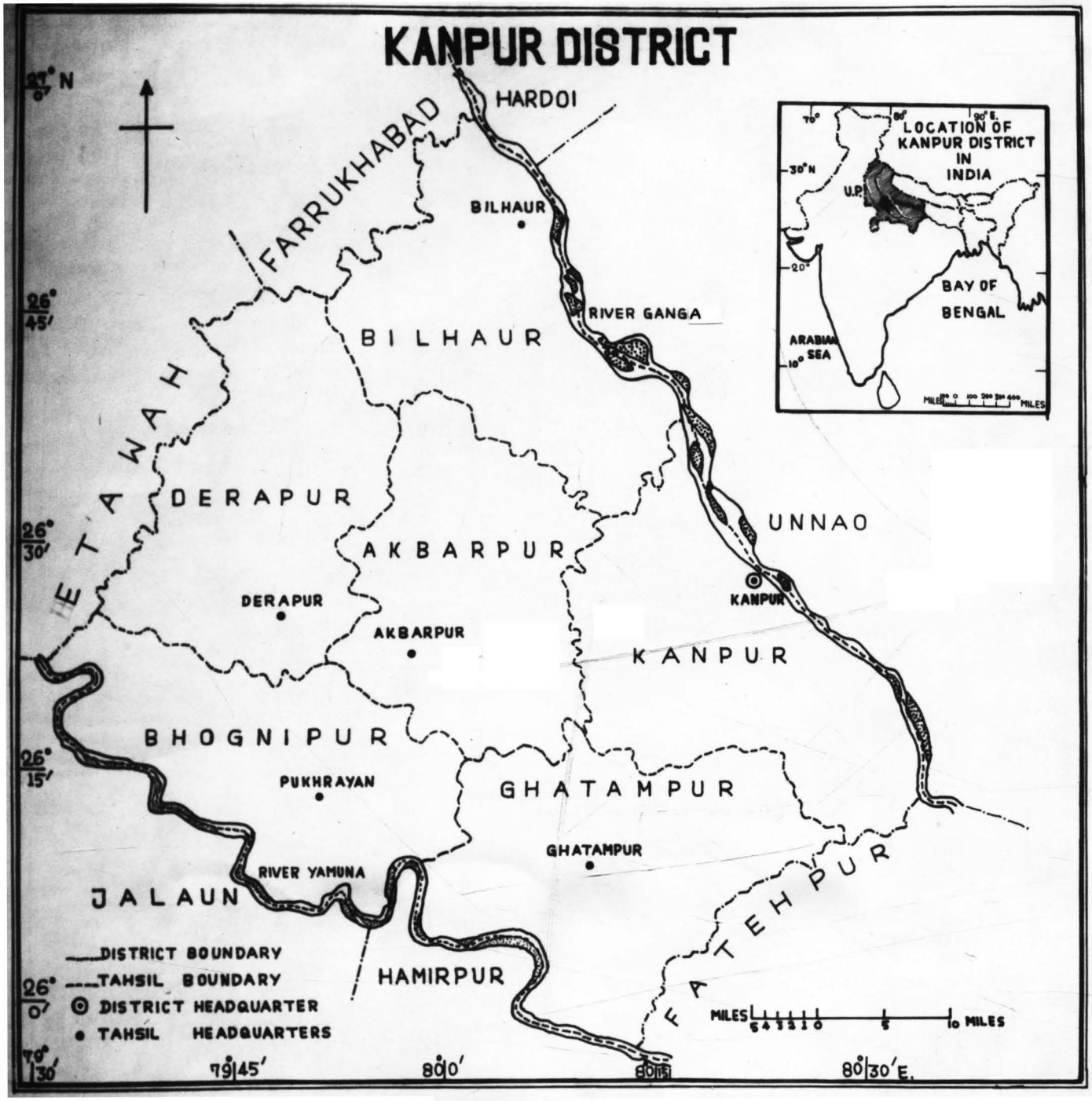

KANPUR DISTRICT
HARDOI
FARRUKHABAD
BILHAUR
RIVER GANGA
BILHAUR
ETAWAH
DERAPUR
AKBARPUR
UNNAO
KANPUR
DERAPUR
AKBARPUR
KANPUR
BHOGNIPUR
PUKHRAYAN
GHATAMPUR
GHATAMPUR
RIVER YAMUNA
JALAUN
FATEHPUR
HAMIRPUR
DISTRICT BOUNDARY
TAHSIL BOUNDARY
DISTRICT HEADQUARTER
TAHSIL HEADQUARTERS
MILES
10 MILES
LOCATION OF KANPUR DISTRICT IN INDIA
U.P.
BAY OF BENGAL
ARABIAN SEA
27° N
26° 45'
26° 30'
26° 15'
26° 0'
79° 30'
79° 45'
80° 0'
80° 15'
80° 30' E.

Fig. 1

and Farrukhabad in the north-west, and the Fatehpur district in the south-east (Fig. 1)

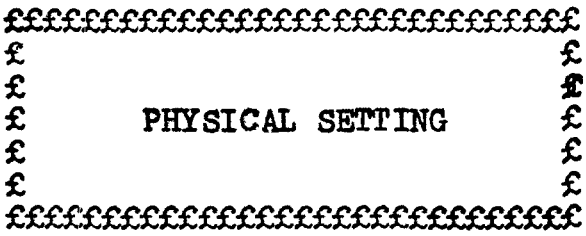
The district of Kanpur resembles, in its general aspects to the rest of the districts of Ganga-Yamuna doab in the fact that it consists of an alluvial plain of Pleistocene and Subrecent alluvium deposited by the rivers of the Ganga and its tributaries. The plain slopes gently from north-west to south-east, following the direction of the rivers. The principal rivers are the Ganga and Yamuna with a number of tributaries like Isan, Pando, Rind, Sengar and Non. All these rivers run more or less parallel to one an-other with narrow strips of land between them. The interior surface of the district is rendered slightly undulating due to the presence of the numerous minor water-sheds that separate the subsidiary drainage lines, and which have the same general trend towards the south-east.

As the district of Kanpur occupies an important place in the agricultural economy of the state and is normally called the 'Emporium of Doab', an objective study into its land use is vital for evaluating its actual and potential resources and their proper exploitation. The area under cultivation in the district amounts to roughly 75 per cent of the total area. On an average the density of rural population is 600 persons per sq. mile in the district.

India is passing through a socio-economic revolution. In this gigantic task of reconstruction, agrarian

planning has become a continuous process, which aims at the adjustment between claims and counter claims and maintaining an agronomic balance between agriculture, forestry , grazing grounds, human habitations and means of communication. Such a scheme implies a coordinated and a conscious effort towards securing a balanced and simultaneously national as well as regional development. In a self-sustained, self-generating and self-reliant economy, the planning for an adequate food supply based on the maximum utilization of the existing cultivated land and reclamation of waste land presupposes the need of an intensive probe into the land-use study of the area. The results of such study help in assessing the production potential and productivity of the cultivated land, but also serve as a guide to the total caloric intake per head per day, a measure so vital for appreciating and improving the living standard of population.

PART - I



C H A P T E R I

STRUCTURE AND RELIEF.

STRUCTURE

The district of Kanpur, structurally, forms part of the Indo-Gangetic Plain, which lies between the Northern Peninsular India and the recently built Himalayan chain. The plain is 250-300 miles wide in its depressed lower portion of the crust and about 1500 miles long. The geological evolution of the plain remains a matter of discussion.

Eduard Suess, the Austrian geologist, suggests tht the plain constituted a 'fore-deep' infront of the high crust waves of the Himalayas as in their southward advance they were checked by the inflexible solid land mass of the Peninsula. The rivers rising from the Himalayas brought an immense amount of detritus and deposited it in this depression. The deposition of the alluvium continued althrough the Pleistocene period up to the present and led to the formation of the plain. On this view the depression is of a synclinal nature-a "Synclinorium".

S.G. Burrard, on the basis of geological data, gives an entirely different view about the origin of this depression. He considers that the plain represents a rift valley

bounded by parallel faults on its two sides with a maximum down_throw of twenty miles.[1] The hollow was subsequently filled up by detrital deposits.

This view, which is based on geodetic observationsand deduction alone, has few geological facts in its support, and is not adopted by geologists, who consider that the Indo-Gangetic depression is only of moderate depth, and that its conversion into the flat plains is due to the simple process of alluviation.[2] R.D. Oldham suggests that the origin of the Gangetic trough is either due to depression of the crust or a subsidence of the crust due to a removal of the denser material below. In either case there would be replacement of denser by less dense material of the same shape and form as the trough it self, but situated at some depth below it.[3]

A more recent view regards this region as a sag in the crust formed between the north ward drifting Indian continent and the comparatively soft sediments accumulated in the Tethyan basin when the latter were crumpled up and lifted up into a mountain system.[4] The depression began to form in the Upper Eocene and attained its greatest development during the third Himalayan upheaval in Middle Miocene.

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(1) Burrard, S.G., on the Origin of the Himalaya Mountains, Geological Survey of India, Professional paper No. 12(Calcutta, 1912), P. 11

(2) Wadia, D.N., Geology of India, (London, 1957), P. 389.

(3) Oldham, R.D., The Structure of the Himalayas and of The Gangetic Plain, Memoirs of the Geological survey of India, Vol.42.part II (Calcutta 1917), P.61

(4) Krishnan, M.S: Geology of India and Burma (Madras, 1960), P.573.

Since then it has been gradually filled up by sediments to form a level plain with a very gentle seaward slope.

According to Wadia and Auden, the trough is believed to be very deep, and its uneven floor carries the series of peninsular rocks (Viz., Archaean gneiss) continuously. The continued loading of this belt by sedimentation since the first uplift of the mountains may have accentuated the sinking of the Archaean floor, but as the process of sedimentation kept pace with that of the depression, there arose the great plain of India.[1] Glennie, introducing a note of caution in these assumptions, suggests that since the rocks of the Peninsula bordering the southern edge of the Gangetic Plain contain minerals capable of causing magnatic effect, magnetic investigation should yield important results.[2]

The total thickness of the alluvium is not ascertained, but from the few borings that have been made it appears that the thickness is more than 1300 feet below the level of the ground surface. All the borings that have been made for the purpose of obtaining a supply of artesian water, have failed to reach the rocky bottom, nor have they shown any indication of an approach even to the base of the alluvium. The deepest bore hole, that at Lucknow lying to the north of the Kanpur district at a distance of about

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(1) Wadia, D.N. and Auden, J.B. Geology and Structure of Northern India, Memoirs of the Geological Survey of India, Vol.73(Delhi 1939), P.123

(2) Glennie, E.A., Gravity Anomalies in the Structure of the Earth's Crust, Memoirs of the Geological Survey of India, Professional Paper No. 27 (Dehradun, 1932), P.22

48 miles, is only 1336 feet and has not touched the rock bottom.[1] R.D. Oldham, on the basis of geodetic data, considers that the depth of the southern half of the Gangetic trough, in which the district of Kanpur lies, reaches 13,000 to 15,000 feet and that its floor has a regular upward slope to the southern edge.[2]

Recent calculations from geodetic surveys however give a much lesser thickness for these lighter deposits resting. On the dense Archaean bed-rock. E.A. Glennie, on the basis of new gravity anomaly readings obtained from different stations in the plain, calculates that the depth of the alluvium is only 6500 feet.[3] But the geological facts are lacking in the figures calculated by Glennie as these figures are based on the geodetic data. This they can not be regarded as reliable and may well be higher.[4]

The alluvial deposits of the Kanpur district, geologically, are divided into two subdivisions: old and new deposits. The deposits of the older alluvium are known as bhangar, which correspond in age with the Middle to Upper Pleistocene, while the newer ones are called khadar of the Recent period. It is difficult to

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(1) Oldham, R.D.; The Deep Boring at Lucknow, Records of the Geological survey of India Vol. 23 P. 263.

(2) Oldham, R.D., The Structure of the Himalayas and Gangetic Plain. Memoirs of the Geological Survey of India Vol 42 Part II(Calcutta 1917) P-82.

(3) Glennie, E.A., Gravity Anomalies and the Structure of the Earth's crust, Survey of India, (Dehradun 1932), P.18

(4) Wadia, D.N. and Auden, J.B., Op.cit, P. 135

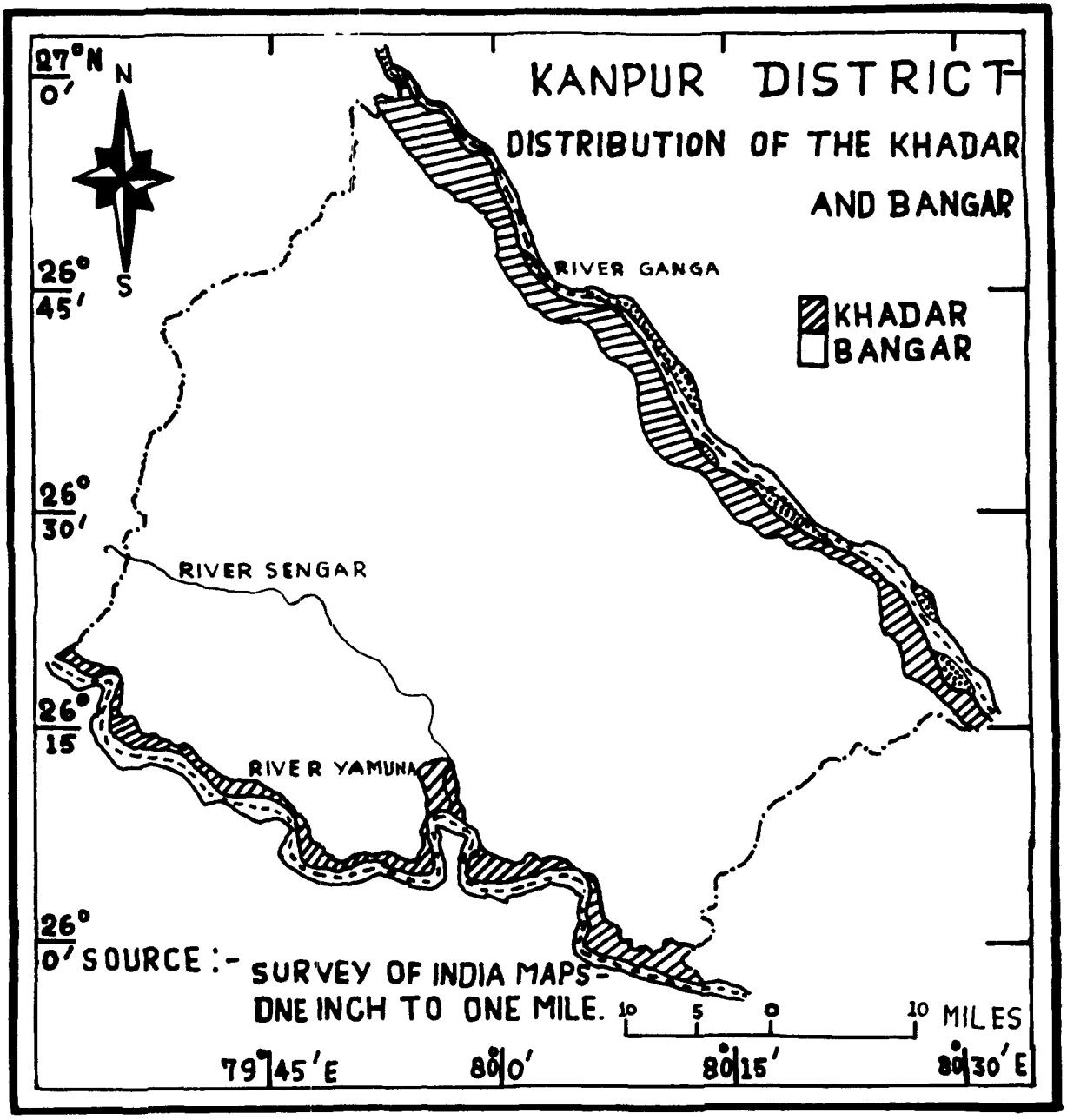
KANPUR DISTRICT
DISTRIBUTION OF THE KHADAR AND BANGAR
27°N
0′
N
S
26°
45′
26°
30′
26°
15
26°
0′
RIVER GANGA
KHADAR
BANGAR
RIVER SENGAR
RIVER YAMUNA
SOURCE :- SURVEY OF INDIA MAPS - ONE INCH TO ONE MILE.
10 5 0 10 MILES
79°45′E
80°0′
80°15′
80°30′E

Fig. 2

draw any distinct line of demarcation between these divisions of the Quaternary era unless they contain fossils characteristic of their age. Bhangar, as a rule occupies a higher ground and is now inaccessible to the rivers, while the Khadar is not far from their present courses.

The distribution of the bhangar and Khadar is shown in Fig. 2. The general level of the bhangar land is 15-20 feet above the highest and 50-70 feet above the lowest level of the river Ganga. Lumps of earthy calcareous matter, called Kankar are found in the bhangar. These have been formed by the segregation of calcarious matter present in the alluvium by the action of underground water. The commonest occurrence consists of small nodules of irregular shape, which are from half inch to three or four inches in diameter. In some places these out-crop formations are wide spread at the surface, while in others they are found at a depth as great as 30 or 40 feet. The land of older alluvium deposits generally of dark colour is characterized by patches of barren saline and alkaline efflorescence known as reh, which are the result of the gentle slope of the land and the composition of the alluvium.

The Khadar merges into the deltaic and other accumulations of the prehistoric times. The newer alluvium is light coloured and poor in calcareous matter. It contains beds of sands and gravel and generally alluvium is fairly stiff clay with more or less sand. Thus, the soils differ in consistency from drift sand to loams and from fine silts to stiff clays. A few occasional pebble

beds are also present. The maximum thickness of the newer alluivum is not known but the records of few borings for artesian wells indicate that it exceeds 3,000 feet.[1] The presence of impervious clays in part obstructs the drainage and also helps in storing underground water under semi-artesian conditions. To some extent such clay-strata also promote the accumulation of injurious salts of sodium and magnesium, which make the soils unfertile. A high flood of the Ganga and Yamuna proves useful to the cultivators in the low lands even when it destroys the standing crops, for it leaves in its wake a deposit of fertile silt.

Bhur denotes superficial feature of geological importance in this area, which represents an elevated piece of land situated along the banks of the rivers Ganga, Yamuna and Isan. Bhur is formed by accumulated wind blown sand during the dry hot months of the year. The sand belt of the river Isan is precarious tract and it is the only area in the district where genuine bhur is found. A large area, however, consists of the poorest possible description of land.

RELIEF

The Kanpur district on the whole is monotonous level plain with a slight undulation towards the interior surface.

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(1) Oldham, R.D., Bhangar and Khadar:- Mannual of the Geology of India (Calcutta), P. 446

The only noticeable relief that of flood plain bluffs, belts of ravines and bad lands formed by gully erosion along some of the rivers i.e.,the Yamuna , Sengar, Rind and Dakhini Non. (Fig.4). The slope of the district is gentle from north-west to south-east, which determines the direction of the principal rivers.

Fig. 3 will show that the level rises sharply from the bed of the Ganga to the crest of the high bank and then slopes gently towards the centre, beyond which it again ascends to the ridge overlooking the valley of the Yamuna. Similar relief occurs in the case of smaller river plains within the district. In case of minor streams the change in the level is hardly perceptible. It will be seen from Fig. 3 that level drops gradually from 450 feet in the extreme north-west to about 400 feet in the south-east. The gradient is very gentle and is approximately one foot in a mile. But the gradient is steep in the tract close to the Yamuna where it is about 10 feet in a mile. The relative closeness of the contours towards the Yamuna as compared to that of the river Ganga shows that the slope along the former is steaper than that along the latter. Both the rivers are generally bounded by high banks, but the left bank of the river Yamuna is less elevated than that of the Ganga, as there is secondary slope from north to south. Thus it is remarkable that the latter river flows at a much higher level than that of the Yamuna.

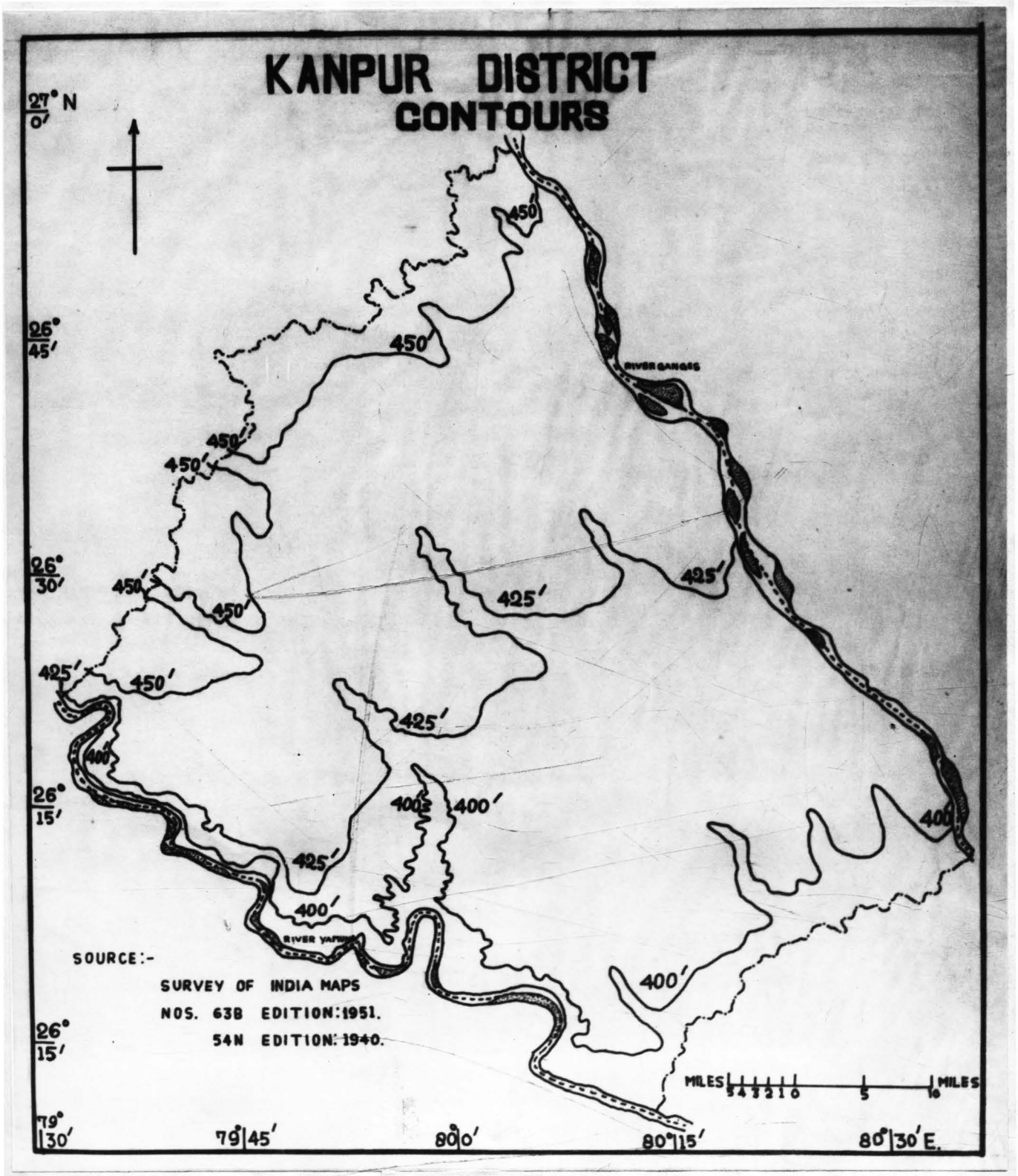
KANPUR DISTRICT
CONTOURS
27° N
0′
26°
45′
26°
30′
26°
15′
26°
15′
79°
30′
79°45′
80°0′
80°15′
80°30′E.
450′
425′
400′
RIVER GANGES
RIVER YAMUNA
SOURCE:-
SURVEY OF INDIA MAPS
NOS. 63B EDITION: 1951.
54N EDITION: 1940.
MILES
5 4 3 2 1 0
5
10
MILES

Fig. 3

DRAINAGE

The Kanpur district as a whole forms the drainage basins of the Ganga and the Yamuna, which receive all the main streams draining this area. All the rivers in the district flow in sinuous courses across the plain forming meanders. The main rivers of the district are Ganga, Yamuna, Isan, Pando, Rind and Sengar. (Fig. 4). The Ganga and Yamuna take their rise from the snowy caps of the Himalayas, while the others rise either from the lakes or from the swamps on the plains. The minor streams and their affluents of the district are seasonal in nature, as their discharge varies from nothing in the hot season to thousands of cubic feet per second during the wet monsoon months. They are mostly dry for eight or nine months and may be flooded for a few days in the year. The main rivers and streams of the district are described in detail.

The Ganga

The Ganga flows along the north-eastern and eastern boundary of the Kanpur district for its entire length, skirting the tahsils of Bilhaur and Kanpur. The river flows in a wide and sandy bed, changing its channel almost every year. Its banks are high and steep, especially the right bank is steeper than that of the left, the flood water sometimes rises 20 to 25 feet, over-flows the left bank and leaves enormous deposits of sand in its wake.

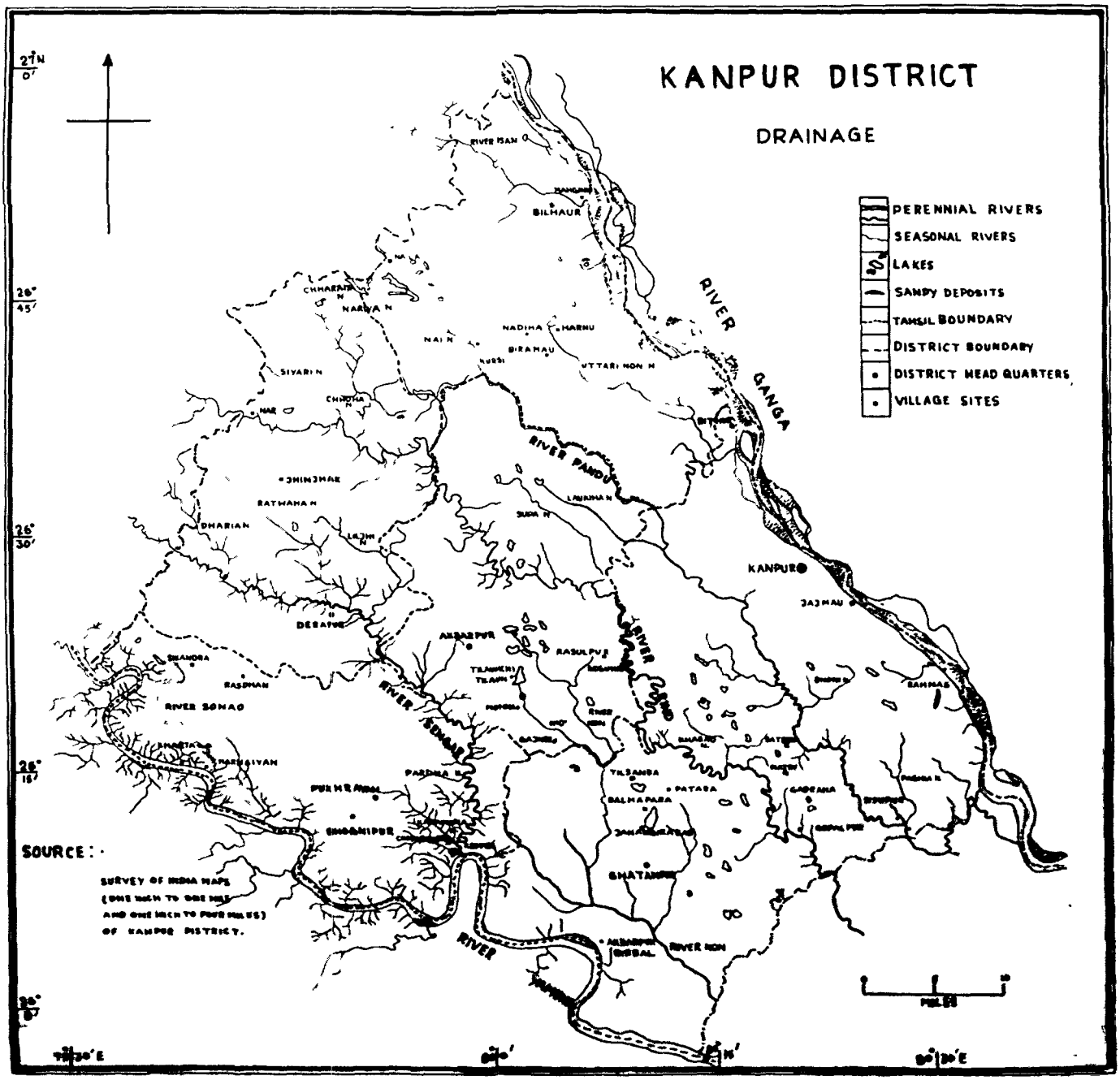
KANPUR DISTRICT
DRAINAGE
PERENNIAL RIVERS
SEASONAL RIVERS
LAKES
SANDY DEPOSITS
TAHSIL BOUNDARY
DISTRICT BOUNDARY
DISTRICT HEAD QUARTERS
VILLAGE SITES
SOURCE :-
SURVEY OF INDIA MAPS
(ONE INCH TO ONE MILE
AND ONE INCH TO FOUR MILES)
OF KANPUR DISTRICT.
RIVER GANGA
RIVER PANDU
RIVER SONAR
RIVER SENGAR
RIVER NON
KANPUR
BILHAUR
DERAPUR
AKBARPUR
RASULPUR
PURWAPUR
GHATAMPUR
MILES

Fig. 4

In the rains the Ganga is of immense breadth and it is as much as one and a half miles, but during the hot weather season the river shrinks to a few hundred yards. Along its right bank, there are generally patches of recent alluvium deposits, which are known as Katris. So far, the formation of the Katri is concerned, sand is first deposited, either on the side of the river, or in the middle of it. Sometimes mud may accumulate over it. The river continues to recede and enables the Katri to increase in its extent. Water flows over the Katri during the times of the flood and again a good deal of silt may be deposited over it. This process is repeated year after year and in due course of time an island overlain with deposits of mud and silt comes into existence. These Katris are utlized for raising vegetables, cucumbers and melons during the dry months of the year. But the agricultural value of these Katris is practically lost, when the river leaves enormous quantity of course sand.

The high bank of the Ganga rises above the sandy shore, which consists of a high edge running in almost continuous line throughout the district, but is broken by innumerable ravines that carry the drainage down to the river. This high bank varies from 25 to 35 feet in height. Some where it attains the maximum height of 70 feet. The bank stands out in fine Bluffs at the village Tari Durgapur in the Bilhaur Tahsil. But between Bithur and Kanpur city a wide stretch of lowlying ground lies, which is entirely alluvial in character but now raised beyond the ordinary floods. (Fig.4) The presence of existing low lying land suggests

that formerly the course of the Ganga was at some distance to the south of its present course. It appears that the course of the Ganga in the northern parts of the district has shifted towards the eastern side. Evidence from the Gazetteer of the Kanpur District shows that between Bithur and Kanpur city a wide stretch of lowlying ground represents the abandoned old river bed, but it is now raised due to the gradual deposits of sand and silt and is beyond the reach of ordinary floods. It is known as a Kachhar, which is a highly fertile tract producing good crops without irrigation.[1] On the basis of the personal inquiry made from the villagers, the writer came to know that the main channel has shifted to the north considerably during the last few decades from the tract mentioned above. The floods have played havoc from time to time withthe land and the people of the Unnao district, which lies to the north of the Kanpur district, but Kanpur is rather on the safe side as its right bank is very steep and checks the overflow of the flood water. The river is still shifting its course gradually to the east and has created a serious problem to the existing site of the power house situated close to the Bharaunghat on its right bank. Two rivers Isan and Uttari Non are its tributaries, which join the river Ganga on its right bank in the district.

The Isan

The river Isan drains the extreme northern part of the Bilhaur tahsil. It has its origin in the south-east of the district of Aligarh (Uttar Pradesh) and traversing through the

(1) Nevill, H.R., Cawnpore (Kanpur): A Gazetteer, Vol.19,(Allahabad, 1929), P. 4

districts of Etah, Mainpuri and Farrukhabad, enters the tahsil of Bilhaur near the village of Makanpur. (Fig.4) It maintains a south-easterly direction and after adopting a sinuous course for about 13 miles through the north-west of the Bilhaur tahsil, it joins the Ganga at the village Mahgawan near Bilhaur. The Isan flows through a sandy valley, which is inundated every year during the rains. A great deal of Bhur often high and undulating occurs on both sides of the river Isan, as it brings much sand during the floods. Close to the banks, sandy mounds are the usual features, which rise with a gentle slope on the north bank, while on the south they are steep. The bed of the river is deep with banks broken at places by ravines. The river-channel is also well defined but a deep bed makes the river difficult to be utilized for irrigation.

The Uttari Non

The uttari Non,[1] a minor stream, takes its rise from the shallow depression near about the village of Harnu, known as Jhabar Geon in the centre of Bilhaur tahsil. The stream alongwith its two nalas (seasonal channels), which join the stream on its right bank, serves the main purpose of draining the excess water of the Ganga low-land tract during the rains and discharges into the Ganga below the town of Bithur. At first, it is a mere

(1) 'Non' is a vernacular term and its meaning is salt.

nala with a very tortuous and illdefined course but it gradually gains in size and after crossing the Grand Trunk Road, it has a marked influence on the land in its vicinity. It possesses a deep valley with wide expanses of broken ground on either side. Its velocity exceeds even 8 miles per hour in times of floods. For a few days during the rains the width of the channel exceeds 4 to 5 furlongs, but in the hot weather it is completely dry. The name of the river refers to the brackish nature of its water, which is due to the prevalence of the saline efflorescence.

The Pando

The Pando rises in the district of Farrukhabad and enters Kanpur district in the north-west near village Naila lying in the Bilhaur tahsil. Flowing with its sinuous course, it maintains its direction parallel to the Ganga and traversing through the tahsils of Bilhaur, Akbarpur and Kanpur approaches its confluence with the Ganga in the Fatehpur district some three miles beyond the Kanpur-border. A number of seasonal channels join the river Pando at various stages, such as the Nai in Bilhaur, Laukiha in Akbarpur, Bhoni in the centre of Kanpur and Paghaiya in the south of Kanpur tahsil. The bed of the river is deep and its channel is well defined. The stream flows at a great depth below the general level of the district. As the river flows through the central low land, its banks overflow with flood water and destroy almost the whole of standing Kharif crops on either side of the river.

The Rind[1]

The Rind has its source in the district of Aligarh, thence flowing through the districts of Etah, Mainpuri, Farrukhabad and Etawah; it enters the Kanpur district near the village Nar in the Derapur tahsil. Flowing from west to east through the tahsils of Derapur and Akbarpur it finally makes its way through the north-east of Ghatampur into the Fatehpur district, where it falls into the river Yamuna. The river is extra ordinarily tortuous and its total length in this district being 105 miles, though its straight line distance from entry to exit is not more than fiftyfive miles.[2]

The river has a deep bed. Its banks on either side are being scoured by extensive ravines.[3] In many places they are covered with dhak (Butea frondosa) trees. The extent of the ravine-belt is on an average not more than a mile on either side. Beyond the ravines a belt of red soil lies, it is sandy loam of high fertility in composition and free from usar. The valley is irrigated from wells. The banks of the river are very steep and the extent of broken and unculturable land is large along the Rind.

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(1) The other name of the river is Arind.

(2) It is the tortuous course of the river that its name has been derived 'Rind' meaning thereby a man of crooked ways.

(3) The ravines of the river Rind are locally known as a 'behar'

The river before emptying itself in the Yamuna is joined by a few seasonal channels on its left bank. It indicates that the slopes of the area is from north to south from the central water divide. The chief channels are: Siyari, which rises in the Etawah district and drains to the north of Derapur. The Chheha and its many affluents such as chhariya and Nariya, which carry off the overflow from the depressions in the south-west of Bilhaur. The Supa nala rises near Nonari Bahadurpur and joins the river close to the village Kashipur. Besides these Satbidha, Matru and Gadraha nalas are its minor affluents. (Fig.4) Owing to the existence of the beds of Kankar at various places, the changes in the course of the Rind in the district of Kanpur are insignificant.

The Sengar

The river Sengar has its origin near Aligarh. After traversing through the districts of Etah, Mainpuri and Etawah it enters the Derapur tahsil on its western border. The river like the river Rind, is tortuous. At first it flows in an easterly direction in the Derapur tahsil and then adopts a south-easterly course close to the town of Derapur. It forms for some miles the boundary between the Akbarpur and Bhognipur tahsils and flowing southwards join the river Yamuna at Keotra near Muhammadpur (Fig.4) On its left bank the Sengar is joined by two seasonal channels Miljhi and Ratwaha. These nalas contain water during the rains but become dry in the summer months. In addition to these nalas, there are a

number of anabranches, which flow for some distance before joining the main river and ultimately form the dalta of the river Sengar. When the river is in spate, its flood-water is diverted into the channels and tears through the inundated land depositing huge amounts of silt. Thus the narrow strips of alluvial tarai are found, which widens towards the confluence of the river. The lowlying Kachhar is of high agricultural value.

The Dakhini Non

Like the uttari Non, it rises in many large depressions in the low lying central tract of the Akbarpur tahsil and the surplus drainage finds its way southwards by several channels, which unite on the Ghatampur border. The western most branch known as the Neor, rises in a swamp at Tilaunchi near Mehna while the Non proper takes its rise from a large lake in the village of Rasulpur-Gogamau which is fed by two nalas that rise near Nariha and Manethu. These two channels unite and the combined stream adopts a southerly course through the Ghatampur tahsil till it approaches close to the river Yamuna in the Fatehpur district. The bed of the Non is at first shallow and ill-defined but further south in the Ghatampur tahsil the channel becomes deep and the low lands give place to extensive ravines, which are of immense size and as extensive as the ravines along the Yamuna.

The Yamuna

The Yamuna enters this district in the extreme west of the Bhognipur tahsil and forms the boundary between the district of Kanpur and the Bundelkhand districts of Jalaun and Hamirpur. The river maintains south-easterly course throughout and makes a number of well defined loops and bends. About a mile north of the village Musanagar, where the river flows in a great loop, it is joined by a tributary called the Sengar. Further south-east in the Ghatampur tahsil, the river flows in a semi circular curve thence it makes an other loop near the village of Akbarpur Birbal. The bed of the river is at a great depth below the level of the district in many places. As the river flows through a wide expanse of low alluvium, there are considerable uneven stretches of Kachhar lying between the waterline and its high bank. The lowest levels are known as tir, which exist below the fertile land of kachhar. Tirs are submerged during the rains. But above the Kachhar, a series of ravines extends in most places. In several places the left bank of the river Yamuna is forty to sixtyfeet high and generally broken by ravines of immense size. The ravines of the river Yamuna are barren and rugged. But in the Ghatampur tahsil the bank as compared to the bank of the Bhognipur tahsil is less abrupt and the ravines are less extensive.

The Yamuna has shifted its course to the south in the district. At a distance of two to four miles from the present

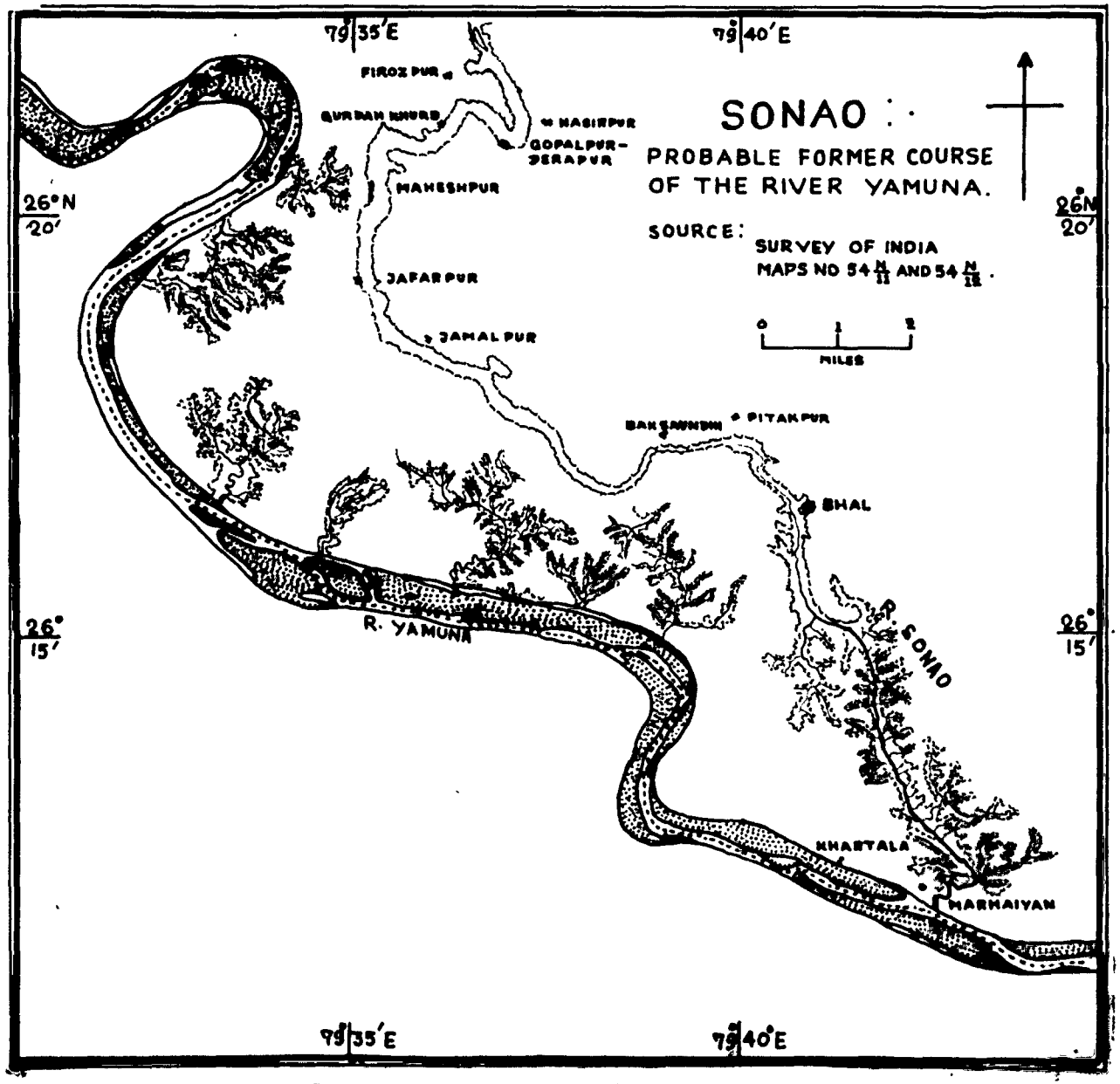
79°35'E
79°40'E
SONAO :
PROBABLE FORMER COURSE
OF THE RIVER YAMUNA.
SOURCE:
SURVEY OF INDIA
MAPS NO 54 N/11 AND 54 N/12.
0 1 2
MILES
FIROZ PUR
GURDAH KHURD
NASIRPUR
GOPALPUR-
DERAPUR
MAHESHPUR
JAFAR PUR
JAMAL PUR
BAKSHWADH
PITAKPUR
BHAL
R. YAMUNA
R. SONAO
KHARYALA
HARHAIYAN
26°N
20'
26°
15'

Fig. 5

course, distinct traces of an old bed can be seen between the village Ferozpur and Marhaiyan.[1] (Fig. 5) The course of this old bed is traceable in the shape of a drainage line known as Sonao, which is rather broad and shallow depression. It is filled with water during the rains. In all probability the present location of the villages Gurdah khurd, Maheshpur and Jafarpur on the right and Gopalpur-Derapur, Jamalpur and Bhal on the left bank of the old channel indicates that these villages were situated on the banks of the former channel of the river Yamuna. The old channel joins the river at the village Marhaiyan near Khartala. (Fig. 5). The Sonao on its northern side has now been much silted up and is being utilized for cultivation.

Lakes

Lakes form an important feature in the surface drainage of this area. The main type of lakes in this district consists of those depressions in the surface, which are not connected with the rivers and in which water collects during the rains and often floods the surrounding land.

Lakes are generally confined to the central low land of the district. The area extending from the north right upto the middle of the Ganga lowland tract also abounds in such lakes.[2] In this region the Harnun swamp has been described as a 'fen country'. A large number of such lowlying areas are now utilized for cultiva-

(1) Gracey, H.K., Settlement Officer: Rent Rate and Assessment Report on tahsil Bhognipur and the Cis-sengar section of tahsil Derapur, District Cawnpur(Kanpur), p.2

(2) The Water of such depression has been drained off by constructing a number of drainage lines.

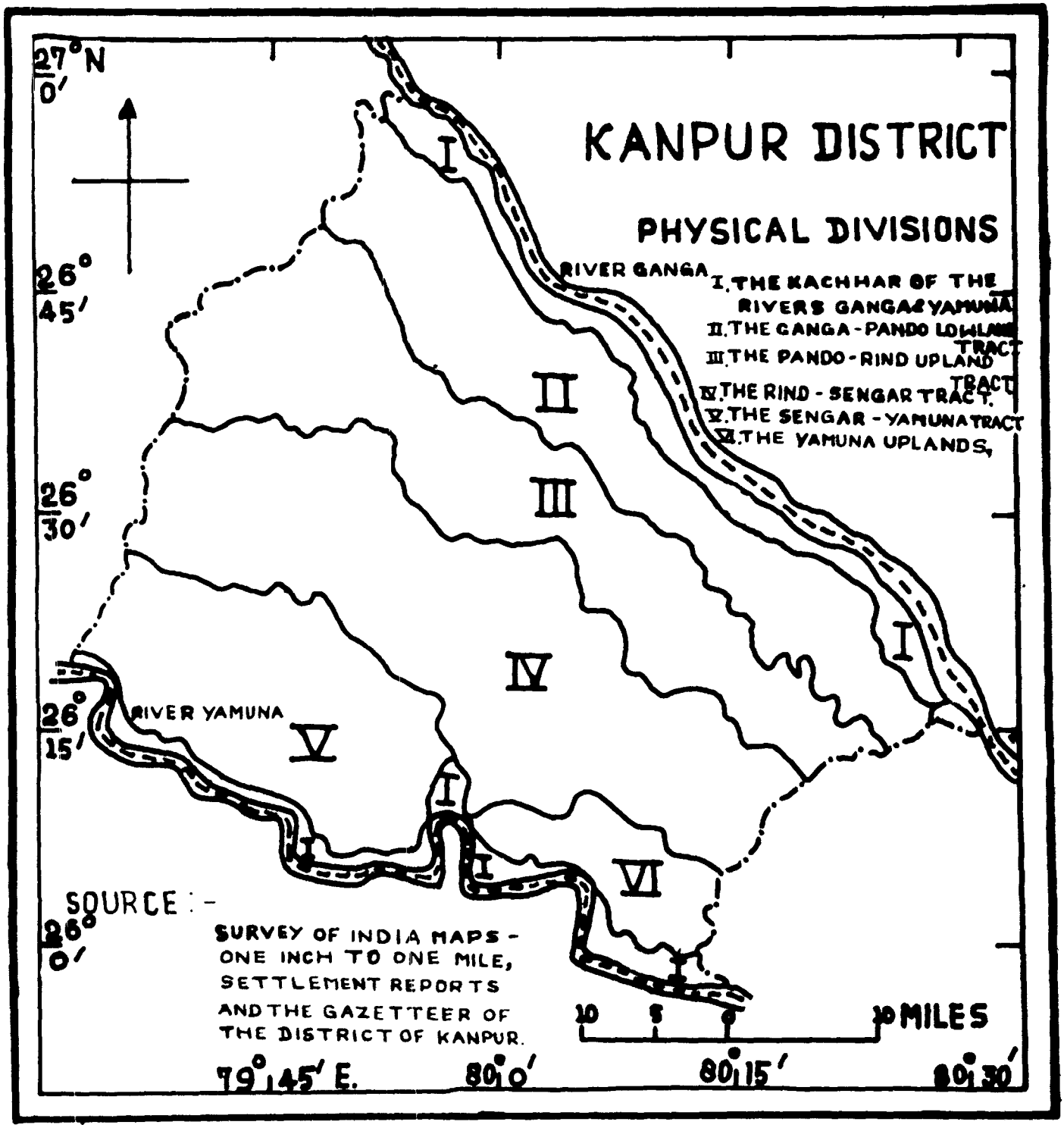
KANPUR DISTRICT
PHYSICAL DIVISIONS
I. THE KACHHAR OF THE RIVERS GANGA & YAMUNA
II. THE GANGA - PANDO LOWLAND TRACT
III. THE PANDO - RIND UPLAND TRACT
IV. THE RIND - SENGAR TRACT.
V. THE SENGAR - YAMUNA TRACT
VI. THE YAMUNA UPLANDS.
RIVER GANGA
RIVER YAMUNA
27° N
0′
26° 45′
26° 30′
26° 15′
26° 0′
79° 45′ E.
80° 0′
80° 15′
80° 30′
10 5 0 10 MILES
SOURCE :-
SURVEY OF INDIA MAPS - ONE INCH TO ONE MILE, SETTLEMENT REPORTS AND THE GAZETTEER OF THE DISTRICT OF KANPUR.

Fig. 6

tion. However, the important lakes (jhils) of the district are Balhapara lake near the village Jahangirabad in the Ghatampur tahsil, Rahnas and Machharia in the Kanpur tahsil, Rasulpur Gagamau in Akbarpur and Itaily and Naila in Bilhaur and Derapur tahsils respectively. (Fig.4)

The lakes, which have originated on account of the meandering action of the rivers are rare in the district.

PHYSICAL DIVISIONS

On the basis of relief and surface drainage, the district can be divided into the following physical divisions. (Fig. 6).

(i) The Kachhar
(ii) The Ganga-Pando lowland tract
(iii) The Pando-Rind upland tract
(iv) The Rind-Sengar tract
(v) The Sengar-Yamuna tract
(vi) The Yamuna upland region

(1) The Kachhar

The Kachhar occupies a tract of varying width along the rivers Ganga, Yamuna and Sengar. This region is inside the fluvial action of the rivers and subject to inundation during the wet monsoon months, while during the cold dry season though the

surface may be dry, yet the sub-soil remains moist and water can be found by digging a few feet deep. The kharif crops are rare as they are usually vulnerable to floods, while rabi crops are cultivated without providing the irrigation facilities and crops, therefore, may suffer from a deficiency of surface moisture. The cultivation depends on the vagaries of rains. The fertility of the soil varies from year to year. Sometimes rivers may claim a piece of fertile land by leaving course sand, and at other times it may deposit a layer of fertile silt and mud on what was formerly poor soil. The soil of the area, therefore, depends upon the action of the rivers.

The Ganga Kachhar may, however, be distinguished from the kachhar of the Yamuna and sengar in that it has attained a permanency, as the river has shifted towards the north, the surface of the kachhar-area is more even than that of the rivers Yamuna and Sengar.

(ii) The Ganga-Pando lowland tract

The Ganga-Pando lowland tract lies to the south of the kachhar of the river Ganga, and consists of a long narrow strip of land between the rivers Isan and Ganga in the north-west corner and Pando and Ganga in the west to east for the whole length of the district. The tract is only broken by a small valley of the river Uttari Non and a few minor nalas (seasonal channels)

This tract is lowlying and abounds in depressions and swamps, one of which forms the source of the river uttari Non. The tract has a defective drainage. Patches of usar and reh soils are common in this area. The usar lands are generally dotted by the patches of dhak (Butea frondosa) and babul (Acacia-arabica). The water table ranges between twenty and twentyfive feet.

(iii) The Pando-Rind upland

The tract between the rivers Pando and Rind stretches through out the entire district in the north-south direction. It comprises the northern portions of the Derapur, Akbarpur tahsils and the southern portion of the Kanpur tahsil. The land lies to the south of the Ganga-Pando tract and is more stable. It is not liable to floods with the exception of the north-west parts of this tract. Here the lakes are few but south-east wards they increase in number. Isolated blocks of usar occur in the north-west and south of the region. The water table ranges between thirty to forty feet.

(iv) The Rind-Sengar tract

The region lies to the south-west and south of the Pando-Rind tract and includes the bulk of Derapur, about half of Akbarpur and northern portion of the Ghatampur tahsil. With the exception of southern part of Derapur and northern half of northern portion of Ghatampur, this area has a very defective drainage and abounds in numerous depressions and swamps in which water collects

during the rainy season and overflows the adjoining land. The soil of this area is ill-drained clay, but the patches of usar and reh soils are also common. Usars are occasionally infested by kans and noxious weeds. In the west of the tract towards the river Sengar the soil is of a peculiar pinkish colour, while to the east of the river Dakhini-Non stretches of sandy ridges are common. The water table in the lowlying areas averages between twenty and twentyfive feet, while in the upland it varies between thirty and forty feet.

(v) The Sengar-Yamuna tract

The tract lying between the rivers of Sengar and Yamuna forms a part of level upland and merges into ravines of the two rivers on either side. The area is effectively drained by these rivers. Depressions are rarely found with the single exception of the Sonac. This area, generally does not suffer from waterlogging, but the whole tract suffers from lack of natural means of irrigation. The watertable varies between fortyfive and fifty feet.

(vi) The Yamuna upland region

The area includes the southern portion of the Ghatampur tahsil. The river Dakhini-Non divides the region into two parts. The land between the Yamuna and Dakhini Non is of varied description. Along the river Non, the land is highly broken

and is fringed with ravines. Beyond the ravines, mostly, in the level upland region occurs Kabar soil containing a fair admixture of sand. The watertable in this tract ranges between sixty and seventy feet.

C_H_A_P_T_E_R II

CLIMATE

CLIMATE

The main features of the climate of the Kanpur district are closely related to seasonal rhythm, and on this basis three distinct seasons may be recognised in the year:-

(i) The cold weather season(November to February)
(ii) The hot weather season (March to mid-June)
(iii)The season of rains (Mid-June to October)

The cold weather season corresponds to the period of rabi crops, while the season of rains[1] to that of kharif crops.

(i) The Cold weather season

In the month of November the entire district comes under the influence of a belt of high pressure, which extends

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(1) The wet monsoon is commonly known as the season of rains.

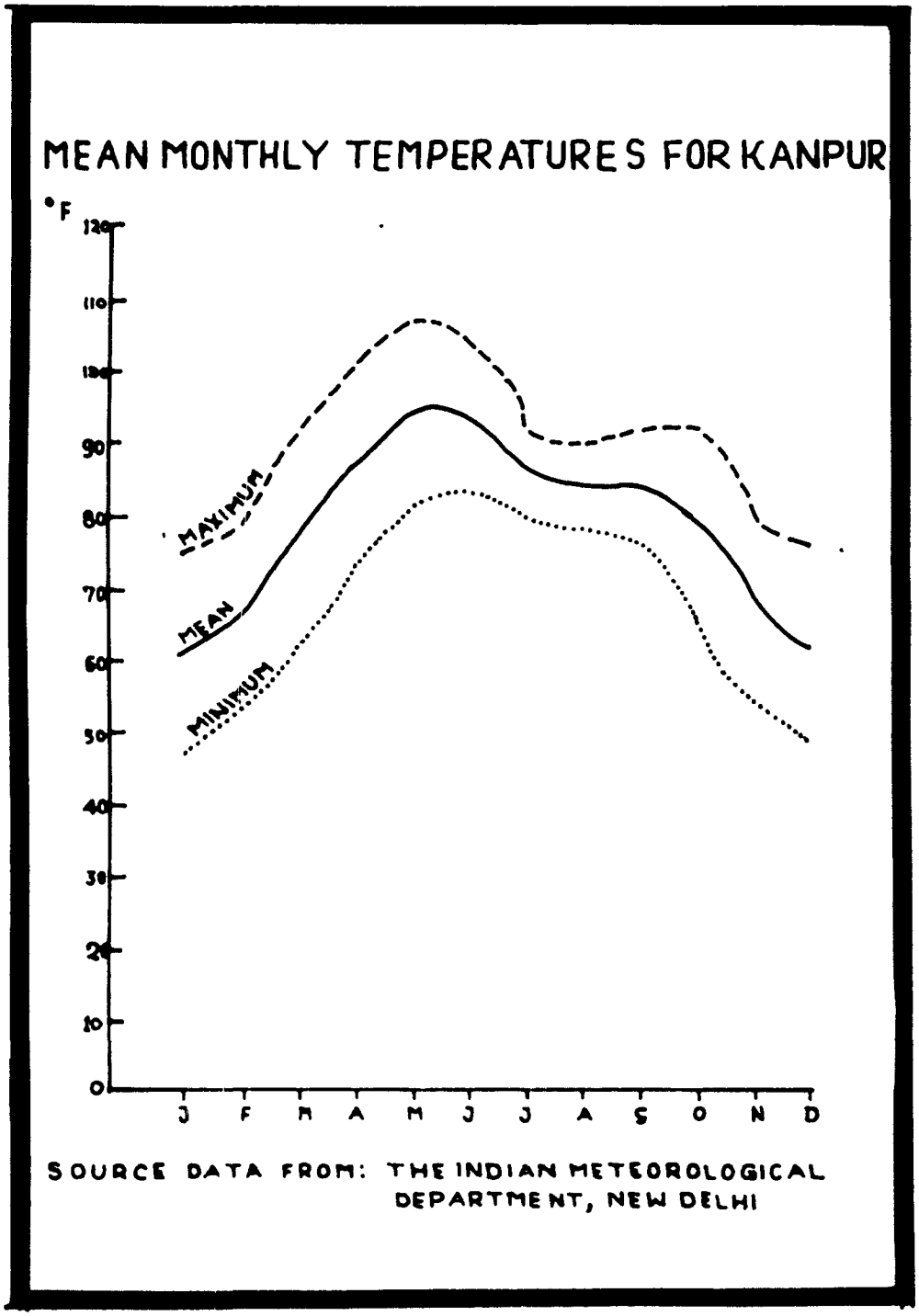
MEAN MONTHLY TEMPERATURES FOR KANPUR
°F
120
110
100
90
80
70
60
50
40
30
20
10
0
MAXIMUM
MEAN
MINIMUM
J F M A M J J A S O N D
SOURCE DATA FROM: THE INDIAN METEOROLOGICAL DEPARTMENT, NEW DELHI

Fig.7

from north-western India. An isobar of 30.05 inches runs over the district. As pressure gradients are not steep enough to produce strong winds, north-westerly winds are very light over the district. The mean monthly temperature in November is 68.3^{0}F (Fig.7) The days are warm, while the nights are cool. The mean maximum temperature in November at Kanpur is 81.2^{0}F, while the mean minimum temperature for the same month is 55.3^{0}F. The month of December registers a further decrease in the mean monthly temperature by about 5 to 7^{0}F. A fall in temperature is being more marked in the minimum than in the maximum temperature. The days are less warm and the nights are cooler. January is the coldest month and records the lowest temperature of the year, the mean minimum temperature of the district being 47.7^{0}F. The diurnal range of temperature is large, being 26.7^{0}F, which is due to active nocturnal radiation.

Frosts are common in the months of December and January, but they are seldom of much intensity. In these months, mist or fog locally known as '<u>kohra</u>' often occurs at night and lasts until the early morning hours. It is often common for 2 or 3 hours before and after sun rise. In February, the thermometer rises slightly, but the month remains colder than November. Thus the cold weather season is characterized by clear skies, fine weather, low humidity and large diurnal range of temperature. The serenity of weather is sometimes disturbed by a series of a few depressions accompanied by moderate rain fall, which pass through the district. Some of these depressions are of Mediterranean origin but some secondaries

also develop over the Persian Gulf in the later part of December, January and February. These cyclonic disturbances are not so frequent over the district as they are in the western uttar pradesh. The cyclonic rainfall is preceded by a warm close weather with light sou-therly or easterly winds and is followed by a considerable fall of temperature and strong and cool westerly winds. On the average 3 to 4 disturbances may be expected in the cold weather season. The relative humidity in the mouth of January varies from 70 to 80 percent. But the damp cloudy weather produces an adverse effect on the rabi crops, as it promotes various plant diseases.

The average monthly distribution of rainfall is shown in Fig. 8. It will be seen from Fig.8 that the total amount of rainfall during the cold weather season does not exceed 1.5 inches. But the cold weather rain, though not heavy, yet is extremely beneficial to the winter crops, especially wheat and barley, as it comes at a time when the plants are flowering. A failure in the winter rains sometimes causes considerable distress among the cultivators.

The cold weather depressions are sometimes accompanied by hailstorms, which cause little damage to the crops if they occur in the early part of the season. But the damage to the crops is considerable when they occur late in the season, for they damage the immature grains of the standing crops.

Cold waves, which are generally experienced in the western district of U.P., fortunately, are rare in occurrence

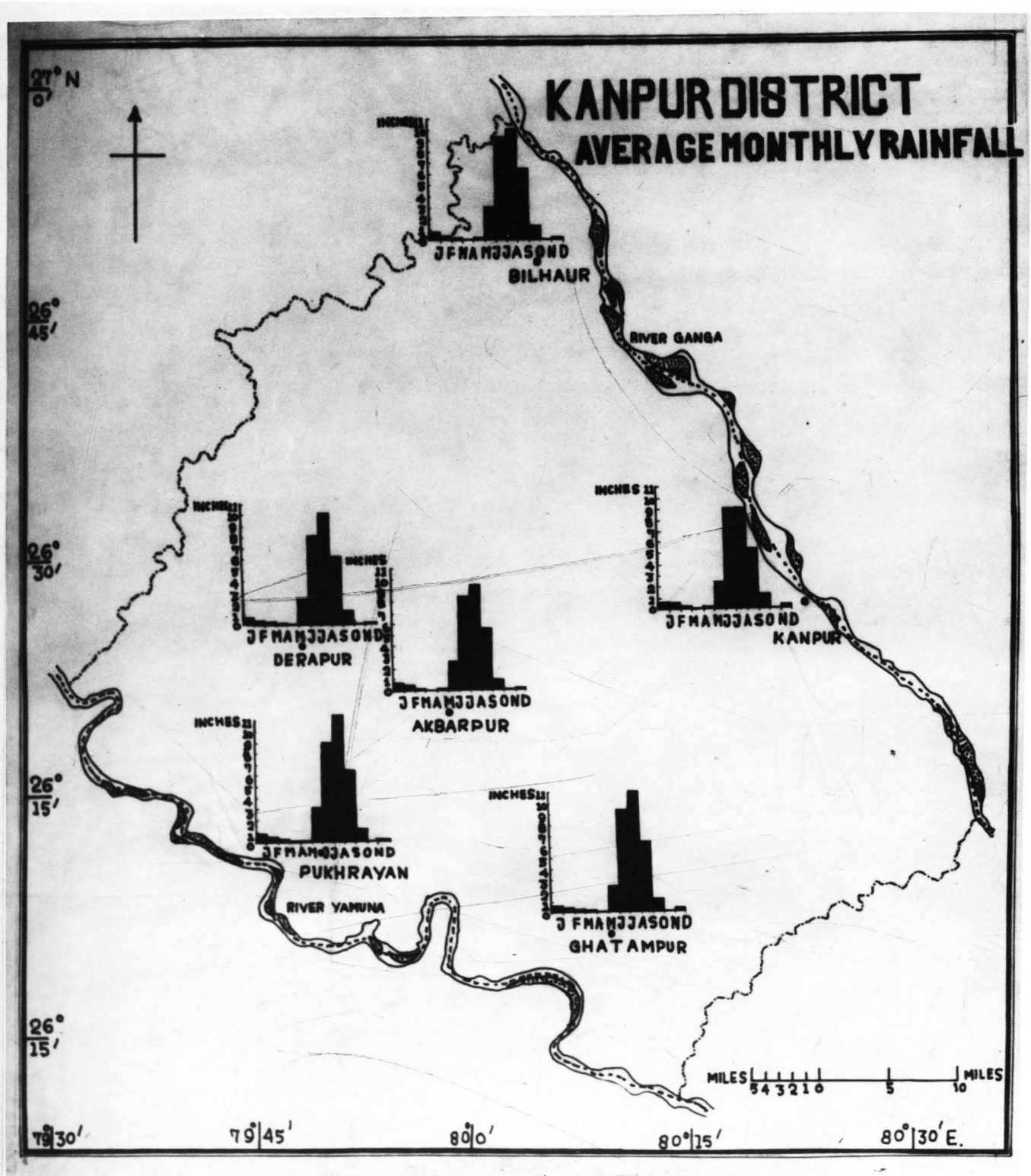
KANPUR DISTRICT
AVERAGE MONTHLY RAINFALL
27° N
0'
26° 45'
26° 30'
26° 15'
26° 15'
79° 30'
79° 45'
80° 0'
80° 15'
80° 30' E.
INCHES
J F M A M J J A S O N D
BILHAUR
RIVER GANGA
DERAPUR
AKBARPUR
KANPUR
PUKHRAYAN
RIVER YAMUNA
GHATAMPUR
MILES
5 4 3 2 1 0
5
10
MILES

Fig. 8

over the Kanpur district. These cold waves reduce the temperature considerably causing very great physical discomfort to the inhabitants.

(ii) The Hot weather season[1]

The hot weather season begins from March, during which the temperature rises abruptly accompanied by a continuous fall of atmospheric pressure. It will be seen from Fig.7 that in this month Kanpur has mean monthly temperature of 76.9°F and the mean maximum and minimum temperatures of 91.5°F and 62.2°F respectively. The mean duirnal range of temperature is 29.3°F, which is fairly high and it indicates that the days are warm but the nights are cool and pleasant. The temperature continues to rise during the months of April and May. The days become hotter and the whole district experiences scorching heat till May. The mean maximum and minimum temperatures for April are 100.4°F and 72.5°F respectively. The sky remains almost cloudless, the relative humidity at Kanpur being only 36 per cent, which is the lowest figure for the whole of the year.[2] The average rainfall in this month is almost insignificant. (Fig. 8) Climatic characteristics such as high temperatures, low humidity, cloudless skies favour the ripening and harvesting of the rabi crops.

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(1) The hot weather season is the second half of the dry monsoon period, while the cold weather season is the first half of the dry monsoon.

(2) Data taken from the climatological observatory of the Indian Meteorological Department of India.(New Delhi)

The month of May records the highest temperature of the year. The mean maximum and minimum temperatures during this month are 107.4^{0}F and 81.5^{0}F respectively, while an absolute maximum of 114^{0}F on some days is not uncommon. Due to excessive heat the land is parched and presents a barren outlook. The diurnal range is as high as 25^{0}F, but it is slightly less than that of April. In the month of June, the mean maximum and minimum temperatures like May are high. Thus, the months before the outbreak of the monsoon, namely, May and June, are the hottest months in the Kanpur district.

The strong, hot and scorching westerly winds, locally called 'loo' blow through out the hot season during the day time generally due to the great intensity of the heat. But their intensity is greater in May and early June. These winds raise clouds of dust with which the whole lower atmosphere becomes surcharged and give a peculiar reddish yellow glare to the sunlight, more especially in the ofter nonn hours. Work is usually suspended in the mid day hours, and any activity out of doors almost is impossible as long as the sun is above the horizon. The winds are very dry indeed, humidity falls to as low as 2 or 3 percent from 12 noon to 4 p.m. on the days, when the hot winds are most vigorous.[1]

(1) The following is the brief statement of the chief features of the airmovement in the Gangetic plain in the hot weather months:
"The air movement in the hot weather is usually feeble during the night hours and varies very little from 6 or 7 p.m. upto 8a.m. It then increases rapidly up to about 1 or 2 p.m. and occasionally, when conditions are most favourable, blows almost with the force of a gale during the next2 or 3 hours, after which it falls again

Contd...2

The hot winds are occasionally interrupted by violent dust storms[2] driving dust, and blow at the terrible speed of 60 to 70 miles per hour. These violent local storms form inregions, where deep humid air from the sea meets the hot dry air from the land.[3] They reduce the visibility to ten or fifteen feet. They blow down trees and thatched roofs. Sometimes these storms are associated with lightning, hail, thunder and torrential rain and, therefore, are very destructive particularly in their high stage of the development. These storms are short lived. The dust and thunder storms of the hot weather season are the result of convective inter action between the dry land winds of the upper strata and the deep sea winds, which creep into the lower strata, and the violent electrical discharges are due to the different electrical conditions of the twe air masses.

The total rainfall during the hot weather season averages 0.66 inch in the Kanpur district. (Fig.8) Within the district the rainfall decreases from north to south. At the district headquarters of Kanpur, for example, the total rainfall for the hot season is 0.66 inch but at Ghatampur, which is about 26 miles to the south of Kanpur, the amount of rainfall is 0.49 inch only.[4] The

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Contd...(1) rapidly until 6 or 7 p.m. when the wind is light and nearly Colm. XXXXIiot, Sir John: The Hot winds of Northern India-Memoirs of the Indian Meteorological Department, Vol. [illegible], Part III, pp. 162 - 163.
(2) Dust Storms are locally known as "andhis".
(3) Chatterji, S.B. Indian climatology (1953) Chapter I, p. 48.
(4) Data given here on the basis of average rainfall of the selected stations, taken from the I.M. D., New Delhi.

decrease in the rainfall from east to west is less conspicuous.

The rainfall of the hot weather season is helpful in giving a temporary relief from the heat of the day, as well as in the preparation of fields for the sowing of broadcast rice, but the violent winds associated with the rains cause immense damage to the mangoes on the trees.

(iii) The Season of Rains

The wet monsoon normally commences in the district by the middle of June. With the on-set of the south-west monsoon rains, the whole character of the climate changes. Its immediate effect is a great fall in the day temperature, the mean maximum temperature at Kanpur, for example drops to 104.4° F. (Fig.7). The moisture-laden easterly winds, known as 'Purva' are clear indications of the arrival of the monsoon.[1] The first monsoon showers are received by the second or the third week of this month.[2] The much-awaited cool spells, coming after many weeks of hot weather, bring a welcome relief. Bursts of rain alternate with rainless intervals, which last hardly a day or two and follow in sucession in the months of July and August. Thus the monsoon period is not of continuous rainfall in anypart of the district.

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(1) It is very interesting to note here about the saying of the cultivators: "Jab Bhuin lot chale purwai, tab jano barkha ritu aaee". (जब भुइं लोट चले पुरवाई, तब जानो बरखा रितु आई).

(2) On many occasions, a day or two of rainy weather occurs about a fortnight before the monsoon sets in permanently, and according to Blanford is called 'The Chhoti Barsat' or'little Rains'. (Blanford,H.F.: The climates and weather of India,Burma and Ceylon.(London 1889) P. 210)

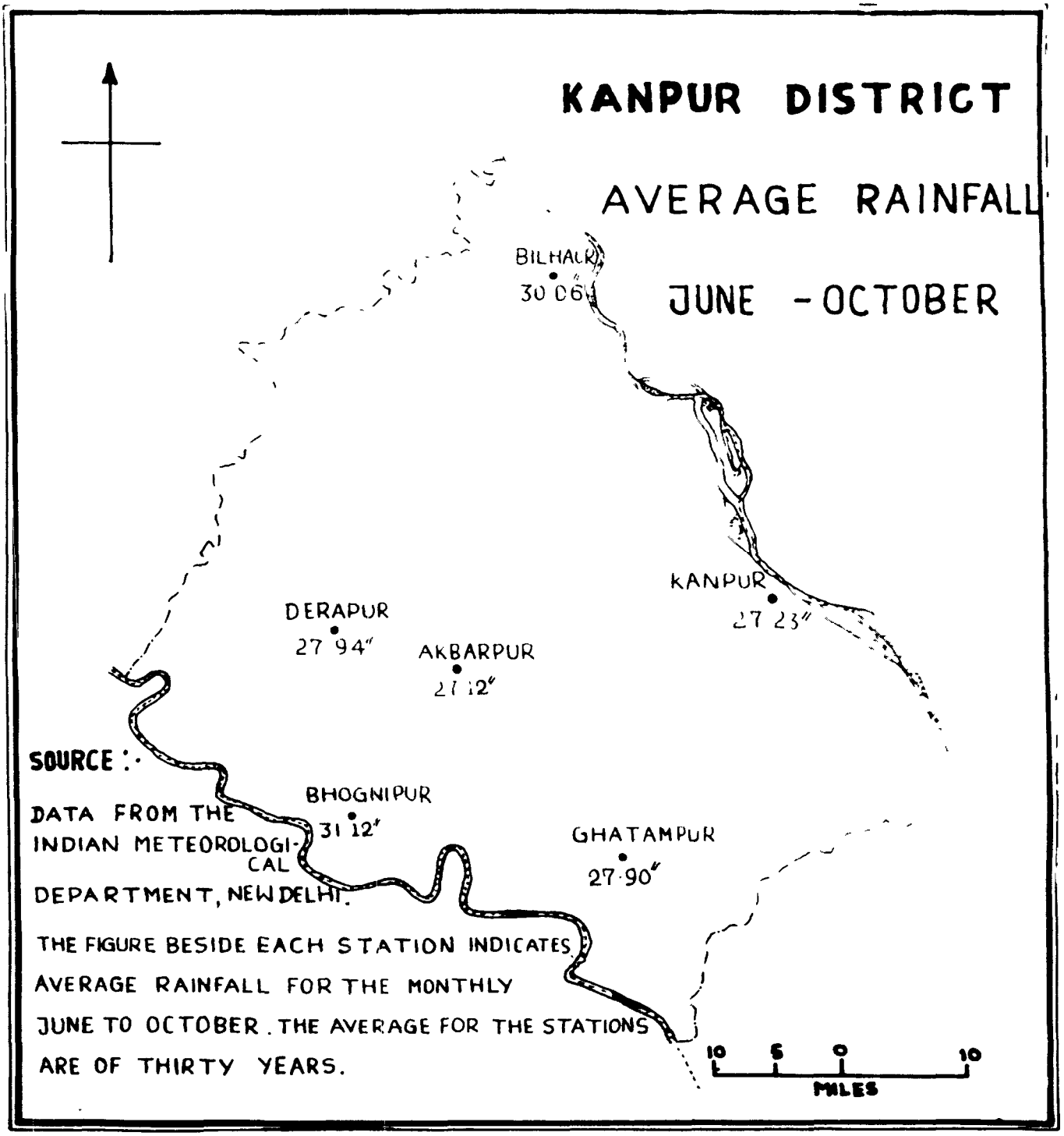
KANPUR DISTRICT
AVERAGE RAINFALL
JUNE - OCTOBER
BILHAUR
30·06"
KANPUR
27·23"
DERAPUR
27·94"
AKBARPUR
27·12"
BHOGNIPUR
31·12"
GHATAMPUR
27·90"
SOURCE :-
DATA FROM THE INDIAN METEOROLOGICAL DEPARTMENT, NEW DELHI.
THE FIGURE BESIDE EACH STATION INDICATES AVERAGE RAINFALL FOR THE MONTHLY JUNE TO OCTOBER. THE AVERAGE FOR THE STATIONS ARE OF THIRTY YEARS.
10 5 0 10
MILES

Fig. 9

The cloud proportion in these months is fairly high, being 7 in July and 8 in August.[1] On account of the high cloud proportion, the mean maximum temperatures show a continuous decrease. For example, the mean maximum temperature for July is 93.3°F, while in August it is only 90.3°F. Whereas, there is an increase of relative humidity from 86 percent in July to 90 percent in August.[2] Consequently July and August are the rainiest months of the year and receive more than 60 percent of the total rainfall. The following table shows the percentages of the total annual for a few selected stations.[3]

Table-I

Stations	Total annual rainfall in inches	Rainfall in July & August in inches	Percentage of the total annual
Kanpur	29.41	18.11	61.5
Bilhaur	32.10	19.32	60.2
Derapur	30.02	18.09	60.2
Akbarpur	28.93	17.97	62.1
Bhognipur	33.27	20.38	61.3
Ghatampur	31.97	20.00	62.6

(1) Cloud proportions are based upon the Daily Weather Maps, published from the Meteorological office, Poona. The method of recording cloud proportion is to estimate the proportion of the sky that is covered by clouds. A completely clear sky is indicated by 0, an entirely overcast sky by 10.

(2) Temperature and relative humidity data are obtained from the climatological tables of observatory in the Indian Meteorological Department, New Delhi.

(3) The rainfall data have been obtained from the I.M.D. New Delhi. The figures for each station are the averages of thirty years.

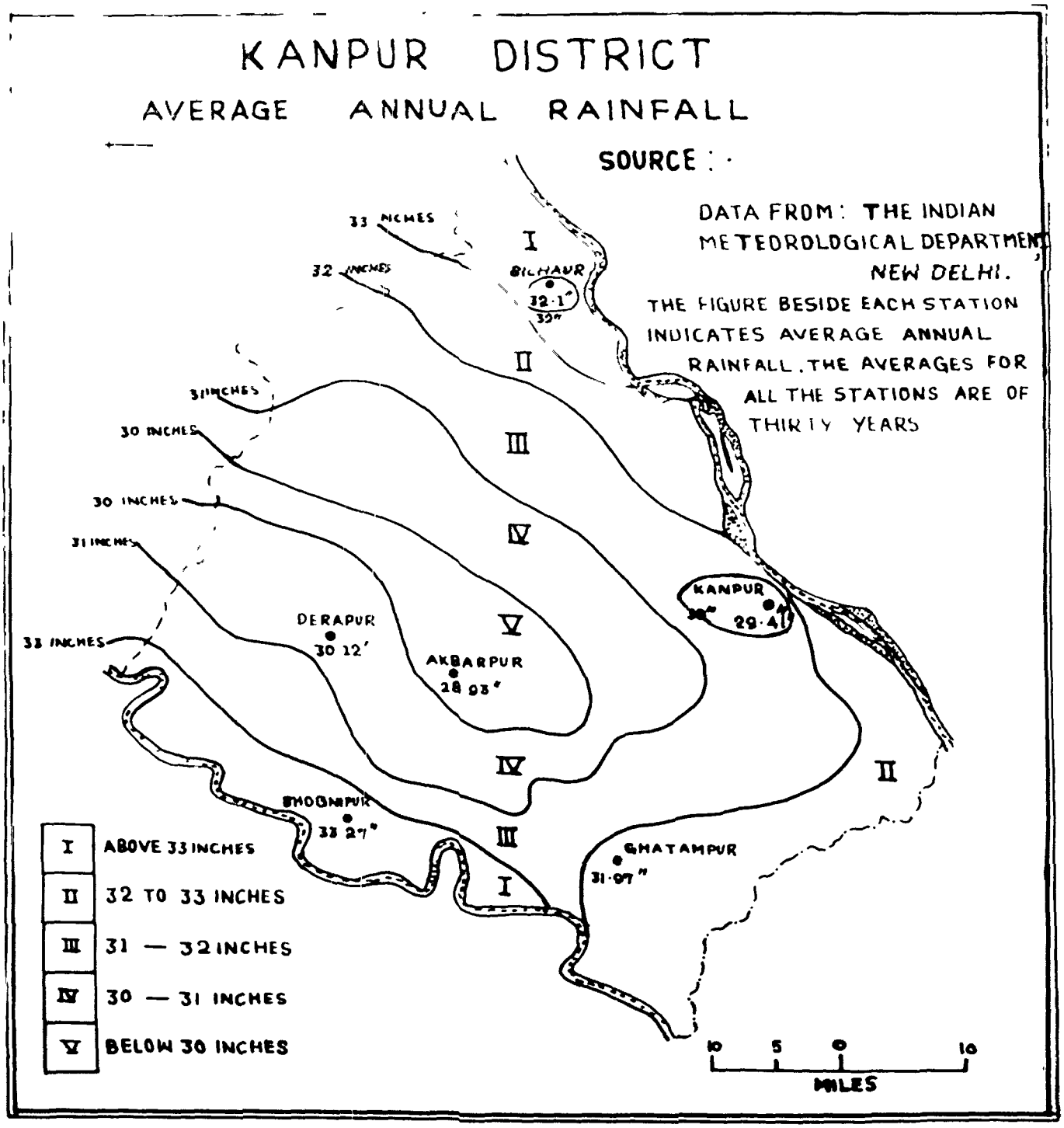
KANPUR DISTRICT
AVERAGE ANNUAL RAINFALL
SOURCE :-
DATA FROM : THE INDIAN METEOROLOGICAL DEPARTMENT, NEW DELHI.
THE FIGURE BESIDE EACH STATION INDICATES AVERAGE ANNUAL RAINFALL. THE AVERAGES FOR ALL THE STATIONS ARE OF THIRTY YEARS
33 INCHES
32 INCHES
31 INCHES
30 INCHES
30 INCHES
31 INCHES
33 INCHES
BILHAUR
32·1"
DERAPUR
30 12'
AKBARPUR
28 93"
KANPUR
29·41"
BHOGNIPUR
33 27"
GHATAMPUR
31·97"
I ABOVE 33 INCHES
II 32 TO 33 INCHES
III 31 — 32 INCHES
IV 30 — 31 INCHES
V BELOW 30 INCHES
10 5 0 10
MILES

Fig. 10

In September, the rainfall normally decreases and rainless intervals become longer. With the cessation of the rains, usually in the last week of September, temperature increases. The mean maximum in the district is 1.4^{0}F higher than that in August. The relative humidity, however, remains high (1.e.85 percent) and the air is almost motionless. In October the mean maximum temperature remains as high as that in September, but there is a further decrease in the rainfall, with the result there is a drop in the relative humidity, which is only 71 per cent. However, waterlogged area, excessive moisture on the ground and in the air, and decaying vegatation under a hot sun make this month usually unhealthy and uncomfortable. Diseases such as fever and dysentery are prevalent.

A comparision of Figs.9 and 10 shows that about 90 percent of the annual rain fall is received during the five months--June to October. In the district, on an average 1 day out of 3 during the wet monsoon is a rainy day, 37 out of the years' 45 rainy days come in the months of June to October and if the total rainfall of the wet monsoon is divided by the number of rainy days in these months, the average fall on each rainy day comes to 0.7 to 0.8 inch. It should be further noted that the heavy amount of rainfall usually in the form of heavy down pours, as a consequence of which the run-off is great in proportion to the quantity of rainfall. This causes the flooding of the drainage channels.

A comparision of Figs. 9 and 10 further shows that the distribution of rainfall in the wet monsoon decreases in

general from north to south and west to east. But there are many local irregularities within the district, which are exceptions. From the bank of the river Ganga to the central lowland(i.e. from north to south) the amount of rainfall decreases, but proceeding southward from the central lowland the amount of rainfall increases again. For instance, Bilhaur lying to the north-west of the district receives30.60 inches of rain, while Akbarpur lying in the central lowland receives 27.12 inches rainfall, but Bhognipur lying about 20 miles to the south of Akbarpur receives 31.11 inches of rainfall during the wet monsoon months. The southern portions of the district are close to the northern ext emity of the Bundelkhand plateau. The succession of the high ground of the plateau advances almost to the bank of the river Yamuna, and brings an increase in the amount of rainfall and pushes northward the axis of minimum precipitation.

The period of the Wet monsoon is not one of continual rainfall and out bursts of rain alternate with spells of fine weather, which are very useful to the crops of the season, but long breaks in the monsoon or an abrupt cessation of the rains is catastrophic to crops and land use. The rainfall ceases usually by October in the district, as the axis of low pressure trough of Northern India pushes towards the foot of the hills and the high pressure trough begins to replace it gradually. In such circumstances the easterly winds fail to penetrate into the district and this causes a break in the monsoon.

Fig. 11

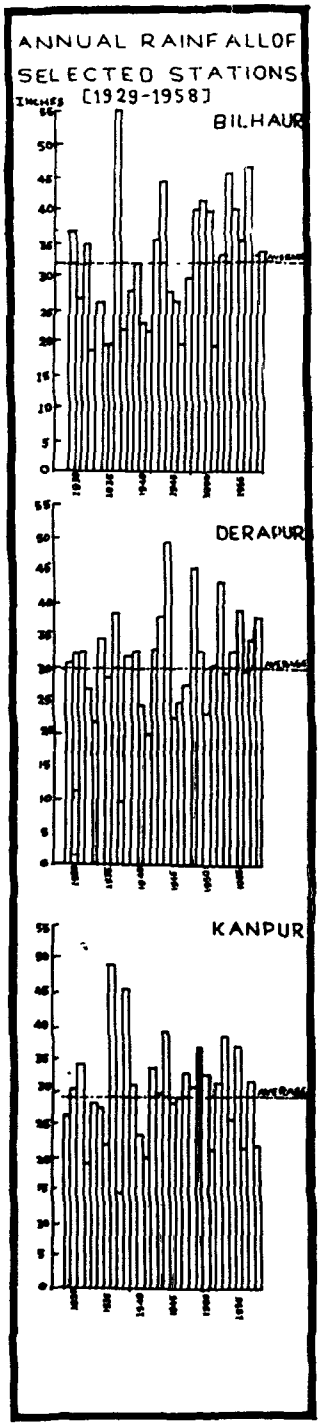

Fig. 12

Fig. 13

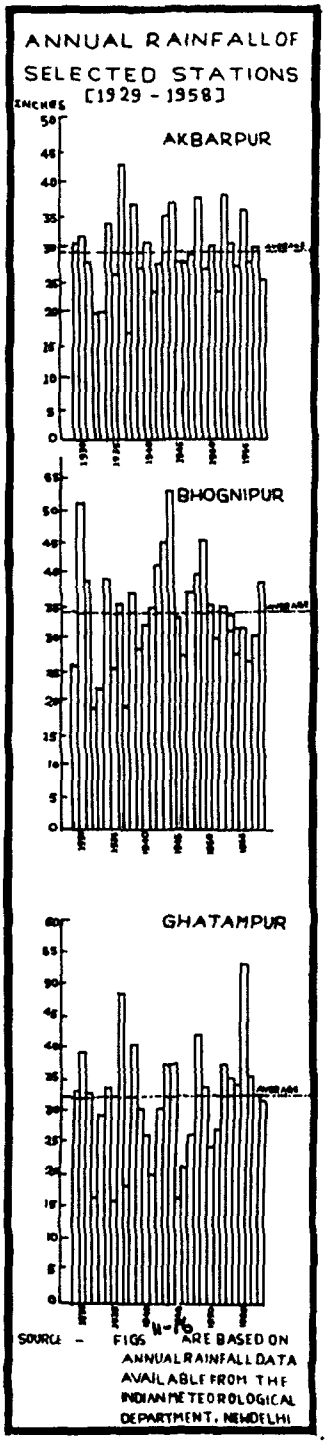

Fig. 14

Fig. 15

Fig. 16

VARIATIONS OF ANNUAL RAINFALL

The variations in the amount of annual rainfall over a period of thirty years (1929-1958) for six selected stations have been shown in Figs. 11-16, which indicate that, in general, the total incidence of the rainfall at different places is subject to great variations. The wettest year, for example on record was 1936, when Kanpur and Bilhaur lying close to the vicinity of the Ganga received 57.09 and 56.56 inches respectively. (Figs.11 and 13), while in the same year the rainfall at Bhognipur was only 34.83 inches a little above the average. On the other hand the rainfall at Bhognipur in the year 1944 was 52.44 inches and was far above the average (Fig. 15), while in the same year the rainfall at Bilhaur was only 27.73 inches, which was slightly below the average. (Fig. 11) Still an other example is provided by the rainfall figures of Ghatampur and Akbarpur for 1955. In that year, Ghatampur received 53.52 inches of rain fall, while Akbarpur received 35.70 inches. (Figs. 14 and 16).

Figs. 11 to 16 further show that the rainfall for 1937 for all the stations was well below the average, and the smallest amount of the rain recorded at Derapur was 9.75 inches only. It can be seen, then, that while all places are liable to suffer from drought or deluge in any one given year, it may also happen that dry conditions may prevail at one station but another station.

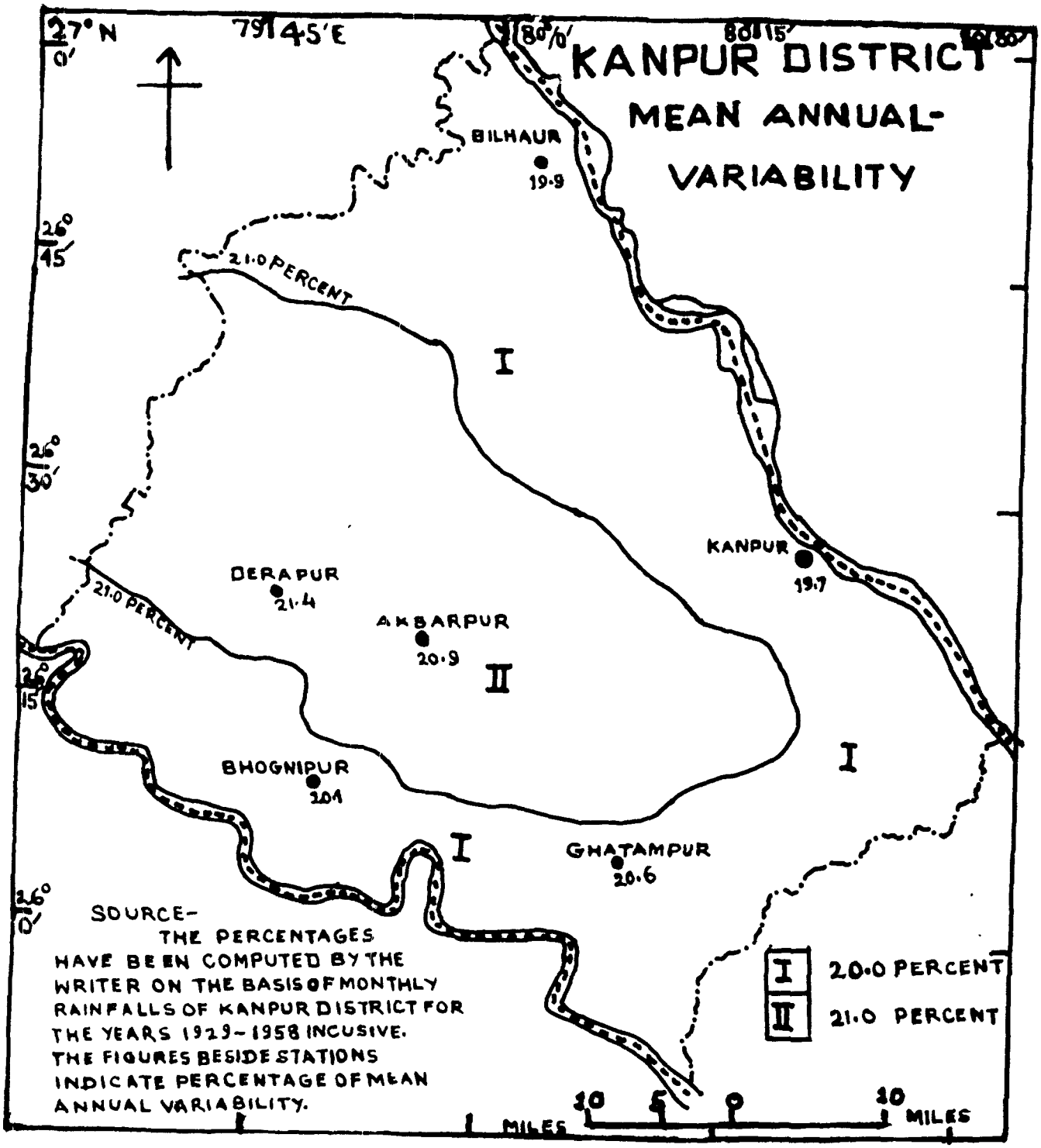
KANPUR DISTRICT
MEAN ANNUAL-
VARIABILITY
27° N
79 45' E
80° 0'
80° 15'
BILHAUR
19.9
26° 45'
21.0 PERCENT
I
26° 30'
KANPUR
19.7
DERAPUR
21.4
AKBARPUR
20.9
II
21.0 PERCENT
26° 15'
BHOGNIPUR
20.1
I
I
GHATAMPUR
20.6
26° 0'
SOURCE-
THE PERCENTAGES
HAVE BEEN COMPUTED BY THE
WRITER ON THE BASIS OF MONTHLY
RAINFALLS OF KANPUR DISTRICT FOR
THE YEARS 1929-1958 INCUSIVE.
THE FIGURES BESIDE STATIONS
INDICATE PERCENTAGE OF MEAN
ANNUAL VARIABILITY.
I 20.0 PERCENT
II 21.0 PERCENT
10 5 0 10 MILES
MILES

Fig. 17

only a few miles away, the annual rainfall may be much in excess of the average for that place. For example, the year 1936 was an exceptionally wet year for all the stations, while in 1937 the rainfall was below the average for all the stations.

VARIABILITY OF RAINFALL

Annual Variability[1]

It can be seen from Fig. 18 that the mean annual variability of rainfall is greatest in the middle part of the area and is least in the remaining part. In the former, the mean annual variability is about 21 percent while in the latter it is 20 per cent.[2] A comparison of Figs. 10 and 17 will show that variability is greatest in the drier parts than in the wetter parts. According to Blanford, an annual variability of 12 percent or more makes an area susceptible to famine.[3]

Variability In The Wet Monsoon Months

From the view point of agricultural operations, the variability of rainfall in the wet monsoon months is more signi-

(1) The variability of the rainfall is the degree in which that of any given year is liable to deviate from the local average" xxx Blanford H.F., Rainfall of India, Burma and Ceylon, pp. 68 -79.
(2) The figures of the mean annual variability show the percentages of mean variations from the average, and are half the difference of the two means computed firstly for all the years in which the rainfall has exceeded the average and secondly, for all those years, in which it has fallen short of the average. The figures have been calculated by the writer on the basis of rainfall statistics of 30 years (1929-1958)
(3) Blanford, H.F., Rainfall of India, Memoires of the Indian Meteorological Department, Vol.III(1886-88), P. 130.

-ficant then the annual variability, for example an insufficient or excessive amount of rainfall in the months of June delays the sowing of early kharif crops. Insufficiency of rainfall in July and August results in the failure of rice crop, and if there is a prolong break in August and September the kharif crops suffer, while if the rains in these months are excessive floods are caused, which damage it. A fall of rain in October ensures the sowing of winter crops. It is also beneficial to the yield of late kharif crops. But some times, excessive amount of rainfall in the month of October also delays the sowing of rabi or winter crops and a few standing kharif crops such as millets and bulrushmillet are damaged.

The following table shows the mean monthly variability of six selected stations for each of the wet monsoon months.[1]

Table- II

Stations	MONTHS				
	June % ±	July % ±	August % ±	September % ±	October % ±
Kanpur	87	39	36	52	155
Bilhaur	77	38	38	40	126
Derapur	85	45	34	45	140
Akbarpur	80	40	28	42	139
Bhognipur	71	39	32	54	144
Ghatampur	80	42	30	48	117

(1) The figures have been computed by the Writer on the basis of monthly rainfall statistics of thirty years for the selected stations. The monthly rainfall figures are taken from I.M.D., New Delhi.

It will be seen from this table that the variability is least in the months of July and August, but it is much higher in the months of October, June, and September. In the first two months it as below 40 percent at all stations (with the exception of Derapur, Akbarpur and Ghatampur) and is as low as 28 percent at Akbarpur. In June variability at all station varies from 70 to 87 percent.

In September it is between 40 to 54 per cent and reaches a maximum in October, when it is more than 125 per cent because the month of October was entirely rainless for a large number of years.

Variability from the Median

The distribution of monthly rainfall over a period of 29 years (1929-1957) for six selected stations in the district has been shown by the rainfall dispersion diagrams in Figs. 18 to 23. The median[1] and other percentile value derived from the diagrams have greater significance in some cases than mean values, in arriving at a more rational estimation of rainfall variability. The idea of applying dispersion diagrams to analyse the variability of rainfall was pointed out by P.R. Crowe[2] and later dis-

(1) The median value is the amount of rainfall actually experienced at a station atleast in any one particular year, and it is useful as an indicator of the probability that in a given series of years half the number of years will experience rainfall above the median and half the number of years below it.

(2) Crowe, P.R., the Analysis of Rainfall Probability, Scott.Geog. Magazine Vol. 49(1933) pp. 73-91.

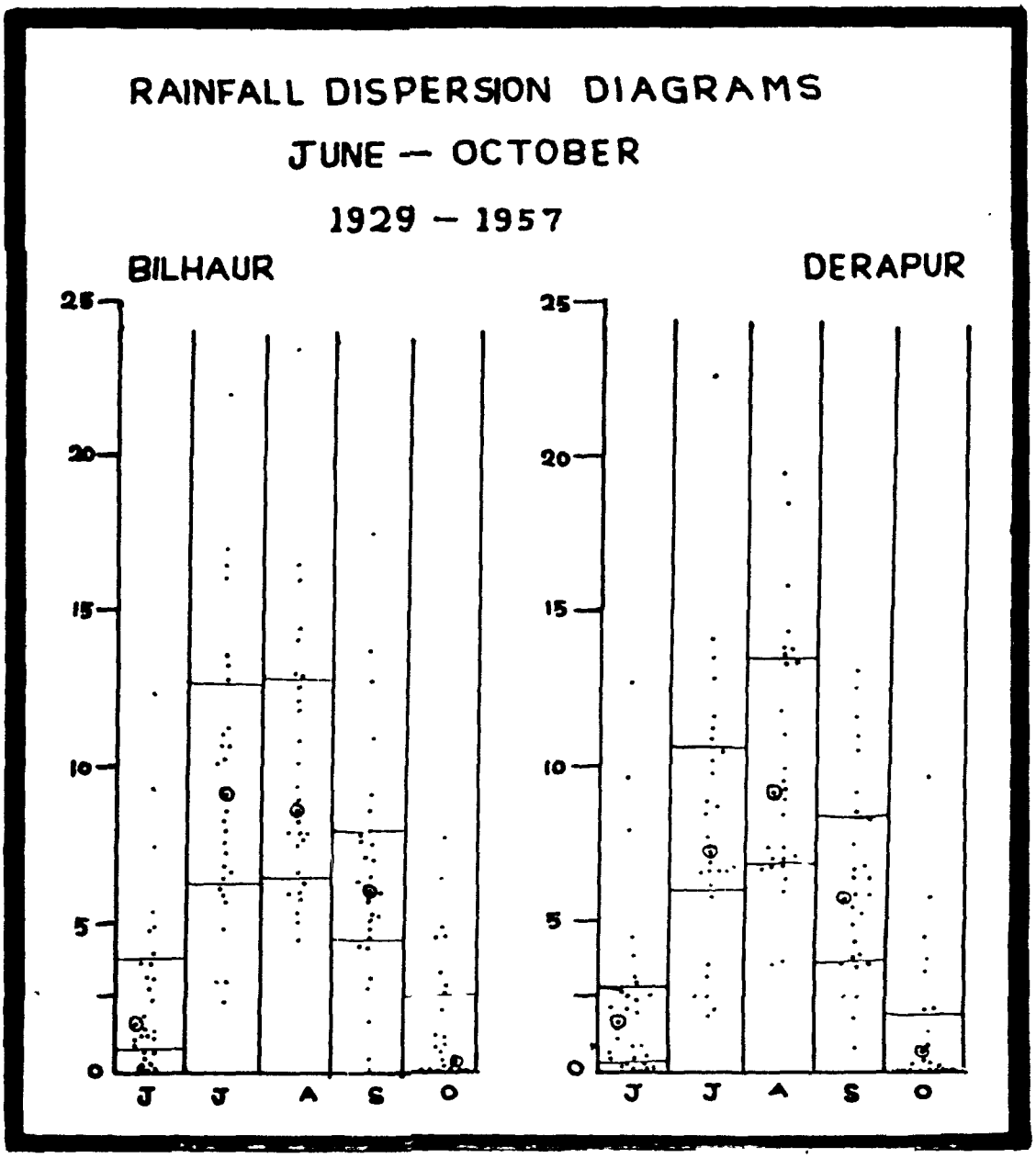
RAINFALL DISPERSION DIAGRAMS
JUNE — OCTOBER
1929 — 1957
BILHAUR
DERAPUR
25
20
15
10
5
0
J
J
A
S
O

Fig. 18

Fig. 19

cussed by H.A. Mathews.[1]

It should be pointed out that the stations relating to Figs. 18-19 are located approximately on a line running from north to south in the north-west of the district, the stations of Figs. 20-21 lie on or close to a parallel line to the south-east of the north-western stations in the central parts of the district, while those of figs. 22-23 are located further in the south-eastwards of the district.

The rainfall dispersion diagrams of the two north-western stations (Figs. 18-19)indicate striking similarities in variability. It will be seen from these diagrams that the variability for July is more or less similar to both the stations, while for August the interquartile range at Derapur is lower than that of Bilhaur. For the month of September the lowerquartile range at both the stations is fairly long, while for October the range is very small, and it is noted that there were atleast 12 such years in which October was completely rainless and there were 5 or 6 years when rainfall was almost insignificant in that month.

A comparison can be made between aforementioned stations(Figs. 18-19) and the second group of the two stations Akbarpur and Bhognipur lying in the central and central-south of the district.(Figs. 20-21) At both the stations, the rainfall

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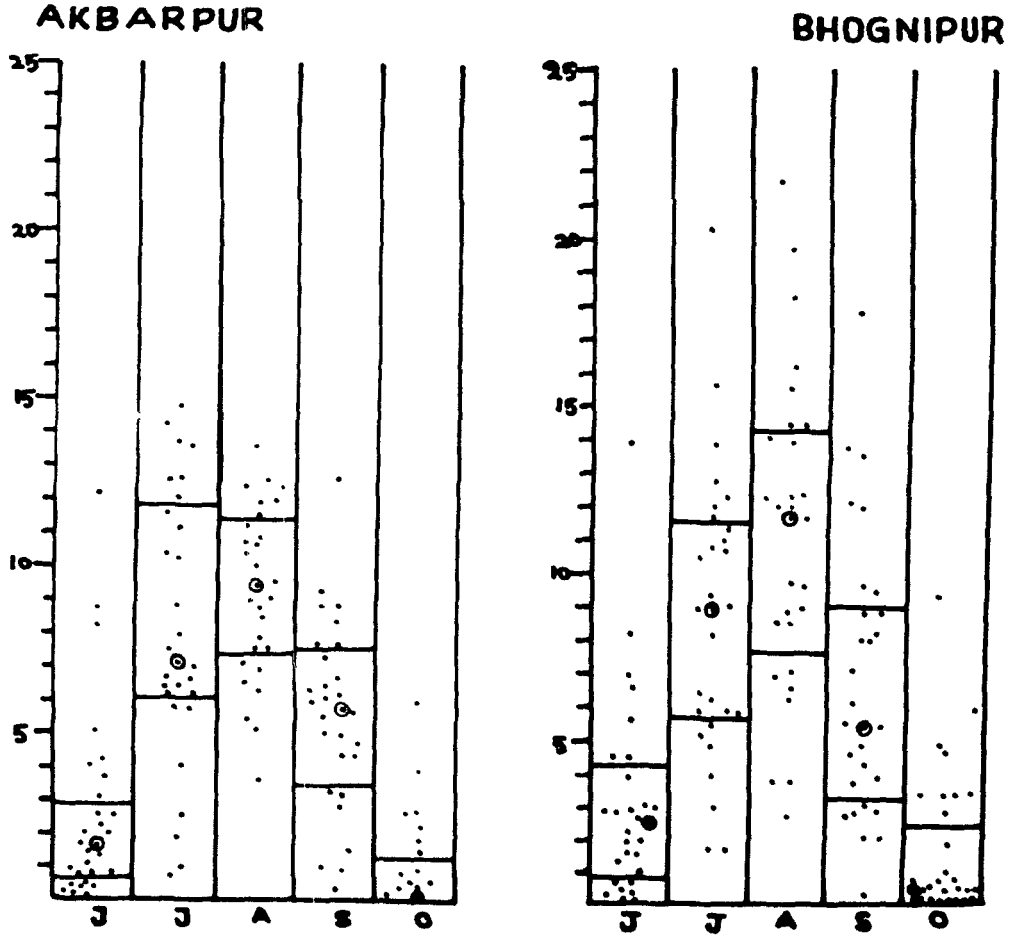
(1) Mathews, H.A. : A New View of Some Familiar Indian Rainfalls, Scott. Geog. Magazine, Vol. 52(1936) pp.84-97.

RAINFALL DISPERSION DIAGRAMS

JUNE — OCTOBER

1929 — 1957



SOURCE — FIGS. 18-23 BASED ON DATA OF MONTHLY RAINFALL FOR THE VARIOUS YEARS, OBTAINED FROM THE INDIAN METEOROLOGICAL DEPARTMENT, NEW DELHI.

(THE ENCIRCLED DOTS REPRESENT THE MEDIAN RAINFALL FOR THE VARIOUS MONTHS AT EACH STATION)

Fig. 20

Fig. 21

of June is more variable, which shows the higher variability than that of Bilhaur (Fig. 18). But in the month of July, interquartile for Bhognipur is fairly larger than that of Akbarpur and in August the rainfall is less variable at Akbarpur (Fig.20) in comparison to Bhognipur (Fig.21). Again at both the stations the rainfall of September shows a pronounced variability, but the rainfall of October is almost similar to that of north-westerly stations. In the two stations lying further east and south-east the medians for June are lower than those for the stations of the second group. (Fig.20-21). At Kanpur (Fig. 22) and Ghatampur (Fig.23), for example the median rainfall in the month of June is 1.1 and 1.4 inches respectively while the average rainfall of these stations is 2.43 and 2.41 inches respectively, that shows the fallacy of the average figures. Again the median value of August for Ghatampur (Fig.23) is higher than that of Kanpur(Fig.22), it shows that August is fairly variable at Kanpur than Ghatampur in the same Fig. 23. As far as the month of October is concerned, it is seen that in 13 years this month was rainless at Kanpur(Fig.22) and in 12 years at Bhognipur(Fig. 21).

It may be concluded that variation of rainfall in June is greater in the central south and lesser in the north-west. More ever, June rainfall is more liable to be deficient in the north-west. Although the interquartile distances as shown in Figs.18-23 indicate that the June rainfall is less variable than the rainfall for July, August and September, but the higher variability of July and August as indicated by the interquartile distances is less

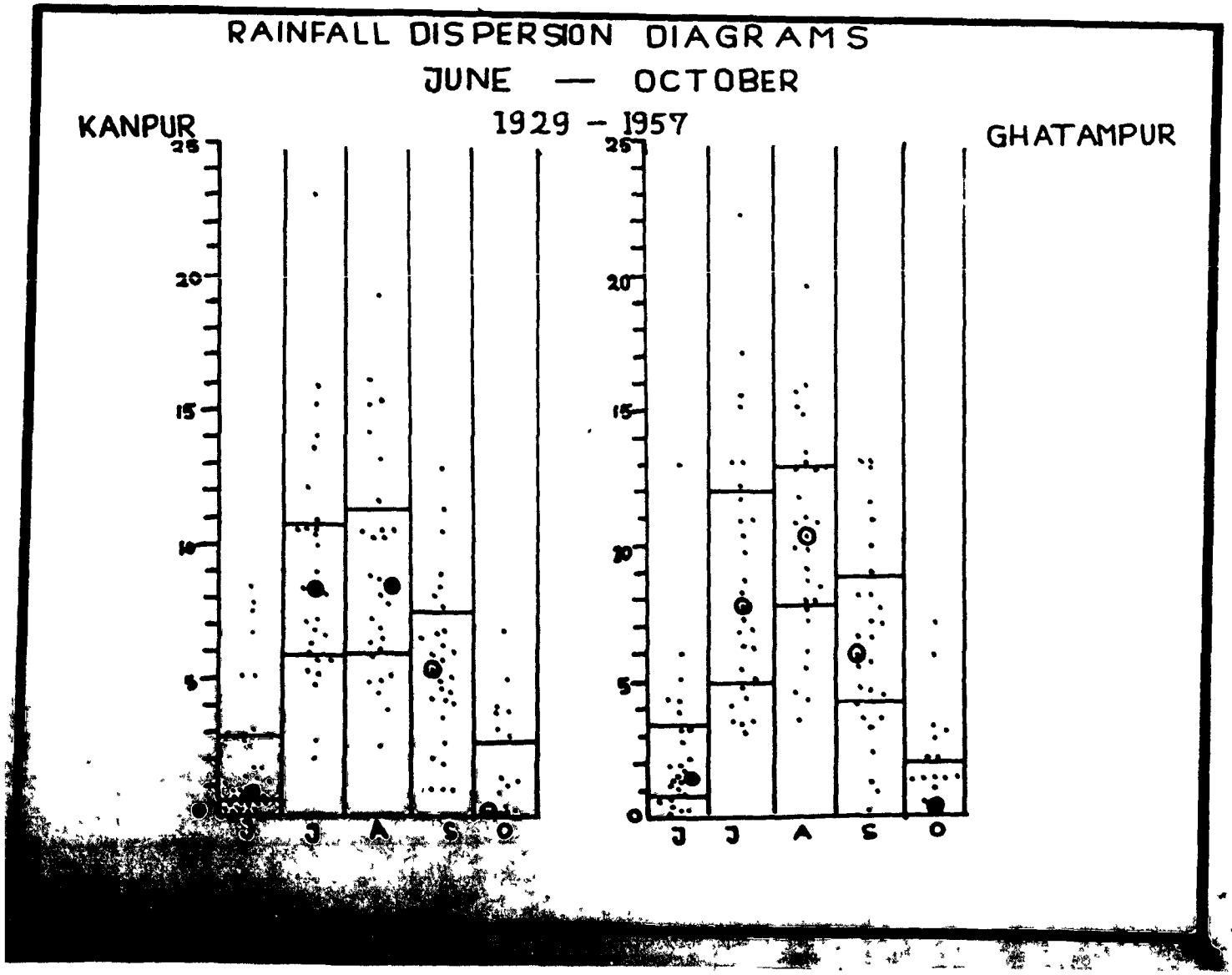

RAINFALL DISPERSION DIAGRAMS
JUNE — OCTOBER
1929 - 1957
KANPUR
GHATAMPUR
25
20
15
10
5
0
J
J
A
S
O

Fig. 22

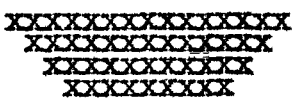
Fig. 23

significant for Agricultural operations inview of the high totals of these months.

The much smaller variability of June is more likely to be much critical for agricultural activities, because the monthly median is low and any reduction in this amount delays the agricultural operations.

At the stations of eastern and south-eastern group (Figs. 22-23) July receives a higher amount of rainfall than August, while the latter month is rainier in the north-western group (Figs. 18-19).

The critical study of dispersion diagrams reveals that rainfall is the most variable in the months of October, September and June. Rainfall in June and October is more liable to deficiency and the district does not show an even distribution of rainfall during the three successive months, hence the rainfall is quite variable in these months of the year, when its regularity is more needed. Such a variability can lead to uncertainities in agricultural operations.



C_H_A_P_T_E_R III

SOILS

SOILS

The soils of Kanpur district exhibit a great variety of composition and appearance, but on the whole they differ a little from those found throughout the middle and lower doab The oldest sources of information regarding the classification of soils of the Kanpur district, available to the writer are the District Gazetteer of Kanpur and the settlement and Assessment Reports of different tahsils of the district, which give the generalized picture of the classification.[1] This classification of the soil is entirely based upon the texture, colour, drainage and the level of the land and each type of soil was given a local name. But the soils of the Kanpur district have been studied in detail by the soil section of the Agriculture Department of the State Government of

(1) District Gazetteer, Kanpur, Vol.XIX (Allahabad,1929)Assessment Report of Tahsil Bilhaur, District Kanpur(1943)Assessment Report of Tahsil Derapur, District Kanpur(1943) Rent Rate and Assessment Report on Tahsil Bhogaipur and the Cis-Sengar Section of Tahsil Derapur, Kanpur (1908).

Uttar Pradesh.[1]

Uttar Pradesh soil survey organization (Department of Agriculture) recognises six main soil associations, which represent different groups of soils and the main distinguishing characteristics of these soil associations have been given on the basis of a careful study of the available data by recording the chemical-mechanical and Physico-chemical properties of the selected sample villages from each tahsil.[2] These are the soils of recent alluvium, Ganga Lowlands, Ganga Uplands, central Low lands, Yamuna flats and Yamuna uplands. But the local minor variatious of soils have been neglected in the soil map because of the difficulty in representing them on the map.

During the course of his field work the writer visited a number of villages in different parts of the district and obtained information on the soil characteristics, on the availability of water supply, manures and on the level of the land. The Writer, thus, has drawn a soil map of the area, showing the classification and distribution of soils (Fig.24) and the local names have also been given to these, viz., bhur or sand on the ridges, balua or sandy and sandy silt in the narrow strips along the rivers of Ganga, Yamuna and Sengar, mativar or clay in the illdrained tract of the central lowlands and domat or loam on the level uplands.[3]

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(1) Agarwal, R.R., Mehrotra, C.L.: Soil Survey and Soil work in U.P., VolI and II(1952)

(2) Physico-Chemical Properties of soils are colour, concretions, texture, drainage, limecontents, soluble salts and average base saturation.

(3) The Map is based on: (i) the soil map of Kanpur district, prepared by Dr. Agarwal, the Agricultural chemist to Govt. U.P. and C.L. Mehrotra the soil chemist, and (ii) the information obtained by the writer in the course of his field work.

The soils of the kachhar are sand to sandy silt or fine mud, whereas loam, clay, stiff black clay(kabar) soils are dominant in the bhangar lands of the district. Calcareous concretions, which are called kankar are found in the soils at various depths. At places, where the soils is impregnated with a high percentage of acidic or alkaline salts, it is known as usar.

(1) Sandy to Sandy silt soils(Soils of the kachhar)

These soils are formed by the repeated deposits of sand and silt brought down by the rivers Ganga, Yamuna and Sengar, when in floods. Sandy soil is found adjacent to the river banks but away from these bahks , it improves intexture and shows an increase in the percentage of silt. In the immediate vicinity of the river Yamuna is a narrow alluvial fringe of recent deposit of silty sand, which is cultivated in minute patches[1]. Further inland, above the ordinary water line is a belt of level or gently sloping kachhar and its soil is silty sand. The sandy soil to be found along the Sengar for distance of five miles above the confluence of two rivers Sengar and Yamuna is locally known as Kondar. The fertility of these soils especially of the kachhar of the river Yamuna depends largely upon the vagaries of the rivers. In some years the river may leave deposits of coarse sand, which is infertile for the cultivation of crops, while another deposits of fine silt mixed with

(I) In south west parts of the district it is locally known as 'Biswa' and land containing this type of soil is known as'Tir'

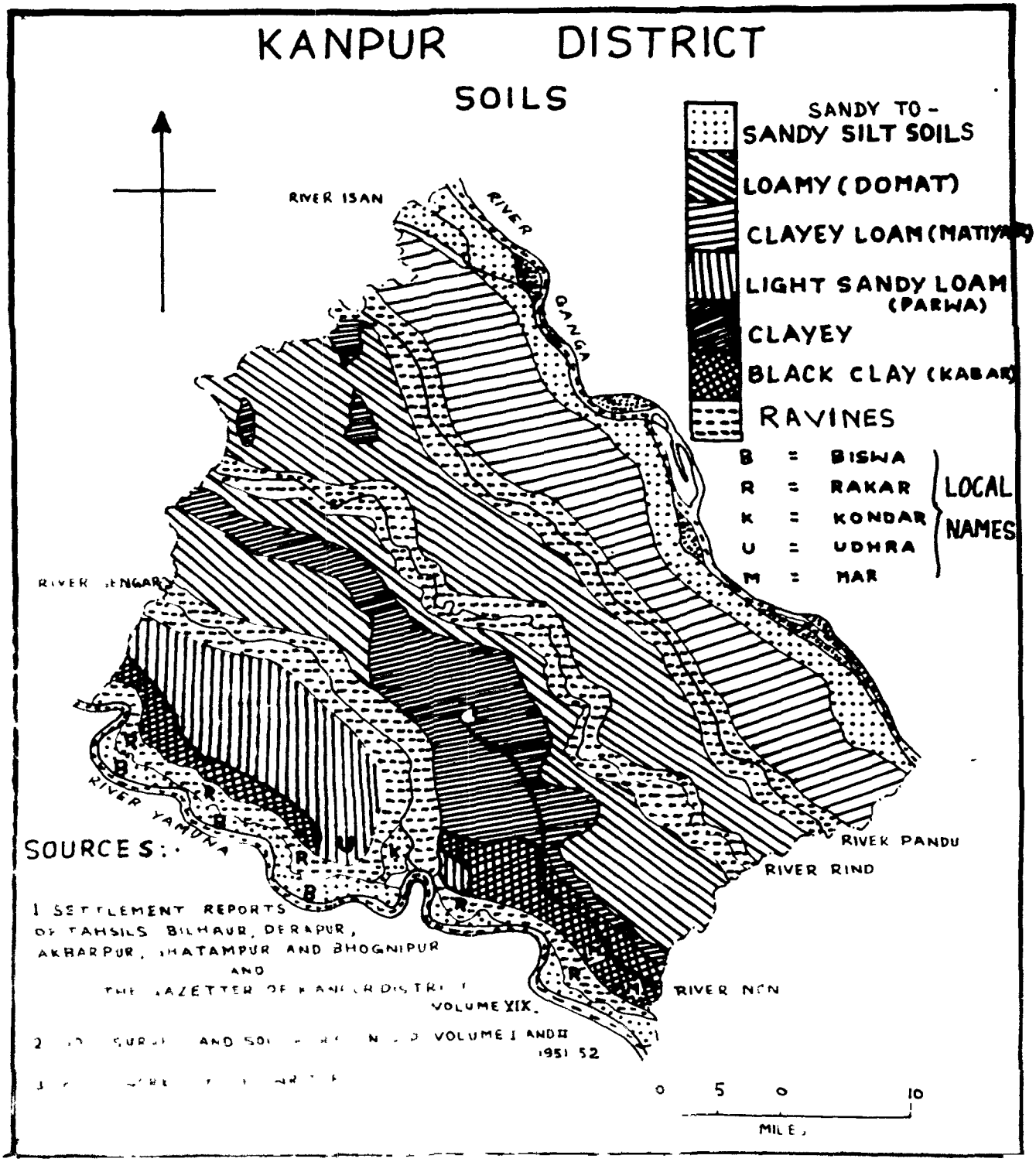
KANPUR DISTRICT
SOILS
SANDY TO - SANDY SILT SOILS
LOAMY (DOMAT)
CLAYEY LOAM (MATIYAR)
LIGHT SANDY LOAM (PARWA)
CLAYEY
BLACK CLAY (KABAR)
RAVINES
B = BISWA
R = RAKAR
K = KONDAR
U = UDHRA
M = MAR
LOCAL NAMES
RIVER ISAN
RIVER
GANGA
RIVER PANDU
RIVER RIND
RIVER NON
SOURCES:-
1 SETTLEMENT REPORTS OF TAHSILS BILHAUR, DERAPUR, AKBARPUR, SHATAMPUR AND BHOGNIPUR AND THE GAZETTER OF KANPUR DISTRICT VOLUME XIX.
2 ... AND SOIL ... VOLUME I AND II 1951 52
0 5 0 10
MILES

Fig. 24

sand may be left over which will grow good crops. The sandy soil is utilized for the cultivation of millets and pulses in the kharif, while the fine muddy silt is used for the production of wheat and gram in the rabi season, especially in the kachhar lands of the Ghatampur tahsil. But in the kachhar of the river Ganga, which is more extensive than that of the river Yamuna, Sugarcane, barley and gram are the important crops.

(ii) Loamy Soil (Domat)

The loamy soil is dominant in the Ganga uplands and occurs in the well-drained parts of the higher levels of the Pando-Rind and Rind-Sengar tracts of the district. The surface soil is characterized by dark grey to reddish brown colour, which darkens with depth and possesses a coarse texture at the surface. The loam can be distinguished due to a different appearance in colour in different parts of the district. The pink or red loam mixed with sand is dominant in the Rind valley, the yellow loam[1] is common to the south of the sengar and in parts of the Ghatampur tahsil, while the grey loam occurs usually in the south-west of Bilhaur, north-west of Derapur and north of Akbarpur tahsil, where the drainage is defective, and the area is much chequered by usar. Patches of clayey loam or clay are also common in this tract. The soils is free of injurious water soluble salts, its water retention capacity is low owing to the open and light texture of the soil, the soils give the appearance of a highly leached and comp-

(1) Yellow loam is locally known as 'Pilia' and is confined mainly to the area lying above the river Sengar.

letely mature profile and represent the normal soil formation of the district. Water table is low as 40-60 feet below the surface. The soil is capable of producing good crops except paddy, if provided with irrigation facilities.

(iii) Clayey Loam

This soil occurs further west from the kachhar of the Ganga upto the left bank of the river Pando in the Ganga low-lands. The area covered with the clayey loam is outside the fluvial action of the river Ganga. The soils on the surface are grey to dark grey in colour, while the lower layers attain a yellowish tinge. The texture of the surface soils varies from loam to clay loam, being always underlain by a heavier subsoil. Its water retention capacity is high as it is rich in clay. At depths varying from four to six feet, calcareous pans (kankar) may occur. Due to their fine texture these soils restrict the free movement of water, and, therefore, are occasionally waterlogged during the monsoon months. The reaction of these soils is slightly alkaline at the surface and alkalinity increases with depth. The soluble salt content is high and the salts occasionally effloresce at the surface during summers. Leaching process has gradually started in these soils. As a result of the process of leaching, clay and lime have been illuviated to lower depths. The depth of the watertable in this inundated tract is 25 feet. Canal

irrigation, wherever available, is practised on these soils. The soils are productive and suitable for either transplanted or broad-cast rice.

(iv) Clayey SOIL (Matiyar)

This soil locally known as matiyar occurs in some-what illdrained central lowlands comprising the area of the southern parts of Akbarpur, north-Western parts of Ghatampur and to certain extent the central portions of Derapur tahsils of the district. The area occupied by the clayey soil is stagnated during the monsoons due to the presence of numerous jhils.[1] The overflow of their water finds its way southward across the country ultimately forming the Dakhini-Non river rising from the large lake in the village Rasulpur-Gogamau of the Akbarpur tahsil. The stagnation of water brings with it wide spread salt efflorescence (reh) during the summer and winter months. The soil has a very poor and defective drainage, as the natural drainage lines are totally inadequate to carry huge volume of water and it can not also penetrate the subsoils due to the presence of thick kankar-bed in the lower depths. The process of water logging gives rise to salts both from the soil as well as from the ground waters, which on evaporation impregnate the surface soils with salts in large quantities. With this result, a significant portion of this tract has been rendered

(1) The stagnated area locally known as 'jhabar', which is the most suitable for transplanted rice.

saline or alkaline and is more commonly classified as usar. Wherever the salts occur in large proportions and the usar land is dominant it is not used for cultivation. Only high lying well-drained interspersed village localities are free from alkali and used for normal cultivation.

The soils are usually clayey to loamy-clay in texture with mature profile development. The colour of the soil varies from ash grey to grey throughout the profile, but the lower layers show a bluish tinge due to waterlogged conditions.

The soil is very rich in lime content, and usually has a layer of calcareous pans (kankar) at varying depths of 5 to 6 feet.

The soil of this tract is highly alkaline and usually the illuviation is not preminent, but in elevated cultivated lands illuviation is not prominent, but in elevated cultivated lands illuviation is visible. Soluble salts are highest. The amount of Kankar renders the soil of little agricultural value. The patches of soils, which are free from Calcium and sodium, are given to the cultivation of transplanted rice, supplemented by the green manuring with a crop of dhaincha, which has proved an ideal green manure for waterlogged and saline areas.[1] The water is within 20 feet of the surface.

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(1) Dhaincha is sown at the rate of 30lb of dhaincha seed per acre and it can be grown under adverse conditions of drought, waterlogging, salanity etc, without much difficulty.

(v) Light Sandy Loam (Parwa)

Sandy loam occupies almost the whole central part of the Bhognipur tehsil mainly in the tract lying above the ravines of the Yamuna and extending to the loamy tract above the river Sengar. The soil is known locally as 'parwa' which is mixture of loam and red sand of some-what brittle nature.[1] The soil is grey to dark grey tending to be brown in colour with mature profile development. Small or medium sized kankar nodules are found at the varying depths of 3 to 6 feet. They usually occur in the subsoils of this group. That is why deep-rooted crops do not flourish very well in this region. The soil is capable to producing big millet, bulrush millet and pulses in the kharif and wheat and peas in the rabi season. Water table lies within 60 feet of the surface.

(vi) Black clay (kabar)[2]

The soil is black to dark brown incolour, predominantly clayey in texture and resembles the black cotton soil in its appearance. The soil occurs just above the limits of the ravines of the Yamuna in the narrow fringe about 3 to 5 miles

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(1) Parwa is one of the Bundelkhand soils, which is generally confined to the area lying above the ravines of the river Yamuna in the Bundelkhand districts of Hamirpur and Jalaun.

(2) Bhur of the ravines of the river Yamuna is known as 'Rakar' while the local name of Dohra has been given to the soil of the ravines of the Sengar, which is richer in fertility than that of rakar and is of reddish colour.

in width usually, in the south-east of the district. The kabar, when wet, becomes so sticky that it is impossible to traverse it during the rains. But when the soil is dry, it becomes very stiff and breaks into many fissures in all directions. Its moisture retaining capacity is high, so that after a normal rainy season the soil can produce a winter crop without irrigation. The soil can only be ploughed when it is sufficiently moistened by the rains. Irrigation is impracticable, since water is bound to sink all too rapidly through the cracks in the soil. Agriculture is dependent upon rainfall. The loss of both the kharif and rabi crops involves owing to the difficulties of irrigation and failure of monsoon rains. The mar, similar to kabar, also occurs in the south-east extremity of the Ghatampur tahsil. The watertable is as below as 80 feet making well irrigation difficult.

(vii) Ravine Soils

An uneven gravelly bhur is generally found in the ravines of the river Ganga, Isan, Rind, Sengar and Yamuna. The soil is usually gritty and light sand and unproductive, because the rivulets and the seasonal channels of these rivers have lowered the productive powers of the adjoining villages, as the yearly rains have washed away completely the richer strata of earth and have broken up the surface into deep and rugged ravines. Fig.24 illustrates the areas of ravines along the rivers. The deep ravines of the river Yamuna are of immense size at times rising to the height of 60 to 70 feet above th river bed. Usually gritty sand and gravels occur in the ravines of Sengar and Rind, while bhur is dominant in

the ravines and high banks of the river Ganga and Isan. The soil is unproductive and does not respond to irrigation facilities. Sometimes crops such as millets, pulses and ground nuts are grown. But ground nuts are grown in the bhur mixed with loam.

In addition to the above classification of soils, the villagers also recognise an alternative system of classifying their cultivated lands on the basis of their location with regard to the village site. The basis of this classification is varying degree of fertility.

The land can be classified as under:[1]
The plots immediately adjoining the rural dwellings, receive the large supply of village refuse as well as a good deal of night-soil. Being near to the dwellings the manuring is less expensive. This type of land is classified as 'Gauhan' similar to the 'Goind' or 'Bara' of other parts. The most fertile and productive land, which is a part of gauhan is known as kachhiana . This type of land is most suited for vegetables, which are generally produced by the hard working kachhis. However, the gauhan lands are capable of cash crops such as sugarcane and Potatoes.

Those fields, lying a little farther away are manured occasionally and those situated at long distances from the village site hardly get any manure. Thus the group lying between

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(1) This classification has been mentioned in the various settlement reports of the district and also in the District Gazetteer of Cawnpore (Kanpur) Vol. XIX (Allahabad),1929 p. 11.

well manured and unmanured land is 'Manjha'. It is further divided into Manjha I and Manjha II, the latter bears rabi and kharif crops alternately, while the former being the highly manured soil, contains a considerable proportion of double cropped fields. The out-lying unmanured land is known as 'Barha' or 'Barhet'.

Usar Soils

The usar soils of the district deserve to be especially mentioned. These soils are unevenly distributed.[1] When sodium carbonate, sulphate, chlorides, together with varying proportions of calcium and magnesium salts occur on the surface of alluvial soils respectively in the patches of clayey to clayey loam soils in the district in large quantities, they begin to interfere with the growth of the crops which in some cases may be prevented altogether. The soils are much impregnated with these salts, as they find their way, by percolation into the subsoil, saturating it up to a certain level in the ill-drained tracts of the central plain of the district. The salts go on accumulating and in course of time become concentrated, forming new combinations by inter action between previously existing salts. Rain water, percolating down wards, dissolves the more soluble of these salts and brings them back

(1) Since patches of usar are often interspersed with small pieces of fertile land, it is very difficult to show the extent of usarland on a map, unless a detailed soil survey is undertaken. But the large proportion of usar land occurs in Akbarpur followed closely by the tahsils of Bilhaur, Derapur and Kanpur.xx Agarwal, R.R. and Mehrotra, C.L.: Soil Survey and Soil Work in U.P. Vol.I and II (1952) p. 24.

to the surface during the summer months by capillary action, where they form a white efflorescent crust (reh). The crops, therefore, can not perish on this type of soil, which becomes charged with alkali salts beyond a critical point.

Reclamation of usar soils

The reclamation of usar soils can be made possible by adopting practices and methods for the removal of the excess salts from the soil. One of the main causes leading to the formation of usar is bad drainage, both surface and underground. Thus a planned drainage system for taking out surplus water is necessary. The application of organic manures is very effective in improving the condition of usar soil, as they lead to improve the permeability of the soil and produce various organic acids, which are capable of neutralizing harmful salts.

The formation of user lands can be prevented by applying gypsum at the rate of 1 to 3 tons per acre once in 3 to 4 years. It may prove extremely beneficial. Silt and press mud from sugar factory have also been found useful for improving the condition of usar soil.

The crop of <u>dhaincha</u> may be sown as a green menure at the rate of 80lb of dhaincha seed per acre. An advantage with this crop is that it can be grown under adverse conditions of drought, waterlogging, salanity etc. without much difficulty. After about one and a half months of its sowing, the

crop is ploughed under and the field is suited for the sowing of transplanted rice. Lastly canal irrigat on is to be done with caution, since salanity may increase if drainage is defective.

SOIL EROSION AND SOIL CONSERVATION

Soil erosion has become one of the acute problems and forms the greatest menace to agriculture of the district. It may never be possible togather completely accurate statistics of the total land area in the district, that has been affected by the soil erosion. It has been observed by the writer that rapid erosion of soil is proceeding along the rivers Yamuna, Sengar and Rind. Considerable acreage of arable land of the villages adjoining these rivers has been victim to gully erosion and lost to agriculture. A large number of fields have been cut into small incisious called 'rills', ultimately forming the gullies. These have crossed each other and taken the form of ravines. Rains have washed away completely the richer strata of the earth. In the case of the rivers Ganga and Pando, the ravine lands are found in a fewer places and on a much smaller scale as compared to these of Yamuna and its tributaries.

Soil conservation implies prevention, control and the most logical use of land, so that fertility of the soil is maintained and improved. For the prevention of erosion, afforestation along the banks of rivers and seasonal channels in a highly eroded and gullied area is necessary, which would

provide complete protection to the neighbouring land. It is a major step to stop erosion. Thus, the only proper land use for ravines is the plantation of forests under scientific conditons. Areas, which are not fit for cultivation, being either steep or shallow should be developed into good pasture lands.

Other effective methods to check the soil erosion include terracing,[1] strip-cropping,[2] protective cover cropping, constructions of embank-ments along the cultivated fields on contour lines, green manuring, crop rotation, draining of waterlo:ged area and reclamation of saline and alkaline soils.

Reclamation of ravine lands should begin from the top by constructing contour bunds or dams provided with vegetative covers at the places, where gully formation begins. This will stop gullies from eating level lands. The land will also be utilized for growing the crops over it. Simultaneously along with the construction of top bunds, successive contour bunds will also have to be constructed, progressing down wards right up to the place, where minor seasonal channels join th: banks of the rivers. Where the soil is sandy, masonry outlets may be needed to check the force of the flow and to regulate the excess flow run off through successive bunds. Since in this type of bunding,

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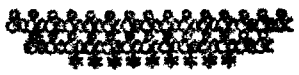
(1) Terracing by the construction of 'bundhies' is the most suitable for the areas, where slopes vary from 20 to 55 feet per mile.

(2) Strip- cropping is sowing of crops at right angle to the slope in alternating strips of legumes and pulses with millets and maize etc.

there will be arrangements for conserving water from the highest to the lowest level. Sufficient moisture will be available for the growth and establishment of all kinds of vegetation including trees, even on the steep banks and the bunds.[1]



(I) Soil conservation in Uttar Pradesh--The Publication Bureau, Information Directorate, U.P., Government, Lucknow: p.8

PART -II

LAND UTILIZATION SURVEY

C_H_A_P_T_E_R IV:

THE SELECTED VILLAGES

THE SELECTED VILLAGES

On the basis of drainage, level of the land, (i.e. high and low lying lands) soil types and the availability of irrigation water, the writer has selected fourteen sample villages, which can be regarded as falling into the following groups:--

Group-I : includes the villages of Daheli, Harbaspur, Khajuri and Pitakpur. These villages lie in well-drained upland plains of Pando-Rind, Rind-Sengar and Yamuna-Sengar tracts of the district, where the soil is mainly loamy. The soil of Daheli is grey loam, that of Harbaspur is red loam while yellow loam (pilia) is dominant in Khajuri. The soil of Pitakpur is light sandy loam red in colour and locally known as parwa. Extensive usar lands are found in the vicinity of the village of Daheli. These villages are partly irrigate and partly unirrigated.

Group-II: includes the villages of Khondhan, Palikhurd, Saruppur and Kunwarpur. These villages lie in the ill-drained lowlying plains

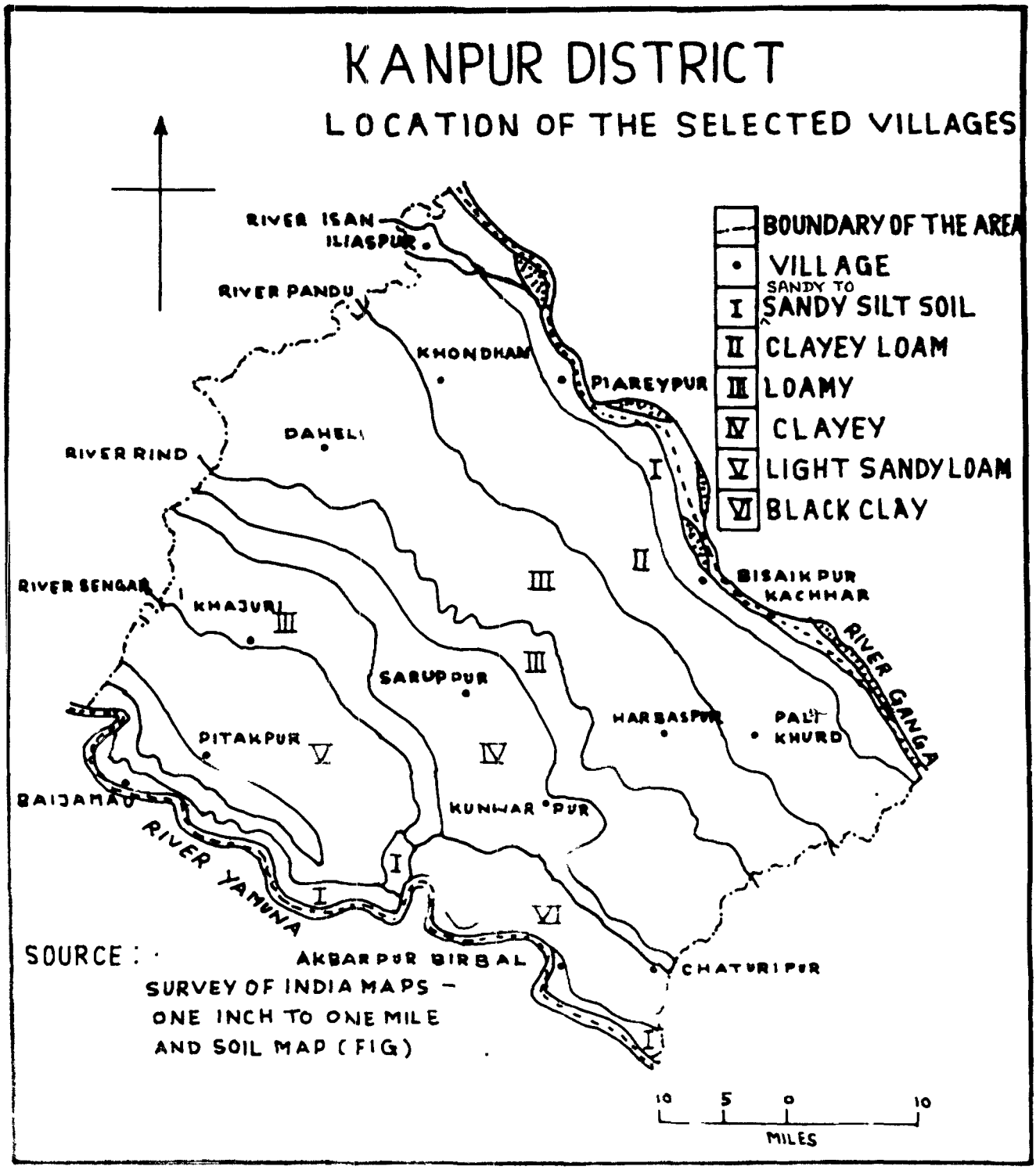

KANPUR DISTRICT
LOCATION OF THE SELECTED VILLAGES
BOUNDARY OF THE AREA
VILLAGE
I SANDY TO SANDY SILT SOIL
II CLAYEY LOAM
III LOAMY
IV CLAYEY
V LIGHT SANDY LOAM
VI BLACK CLAY
RIVER ISAN
ILIASPUR
RIVER PANDU
KHONDHAM
PIAREYPUR
DAHELI
RIVER RIND
RIVER SENGAR
KHAJURI
SARUPPUR
BISAIKPUR KACHHAR
RIVER GANGA
HARBASPUR
PALI KHURD
PITAKPUR
BAIJAMAU
KUNWARPUR
RIVER YAMUNA
AKBARPUR BIRBAL
CHATURIPUR
SOURCE :
SURVEY OF INDIA MAPS –
ONE INCH TO ONE MILE
AND SOIL MAP (FIG)
10 5 0 10
MILES

Fig. 25

of the Ganga-Pando tract and the central low land of the district, where the soil is mainly clayey loam or clayey. Patches of usar with clayey depressions known as jhabar in which transplanted rice is mainly grown, are the dominant features in these villages. These villages enjoy excellent canal irrigation facilities.

Group-III (A): includes the villages of Bisayakpur Kachhar, Akbarpur Birbal kachhar and Baijamau kachhar. Bisayakpur kachhar stands in the permanent kachhar belt of the river Ganga, while Akbarpur Birbal and Baijamau kachhar lie in the bir and kachhar lands of the river Yamuna. The soil of these villages is sandy to sandy silt and is not irrigated.

Group-III (B): includes the villages of Piareypur and Iliaspur. These villages are situated on the right high banks of the two rivers Ganga and Isan respectively. They lie in the bhur lands and the soil of these villages is sandy or light sandy loam. Owing to constant erosion, the soil has become impoverished and its value as an urable land is further reduced by the absence of irrigation.

Group-IV : includes the village of Chaturi-Ka-purwa. It lies in the Yamuna upland region and its soil is black clay or kabar. The soil becomes very sticky during the rains and cracks into fissures in the dry months. Irrigation facilities are not good.

Fig. 25 shows the location of all the selected villages.

Before dealing with the land utilization of the above mentioned villages, it would be worthwhile to give some clarifications.

The first clarification is in respect of the agricultural seasons. Kharif is the season of summer monsoon crops, which begins with the on-set of the rains (in mid-June to July) and ends in autumn (in the month of October), while rabi is the season of winter crops, which begins just after the rains and lasts in spring (i.e. November to March)[1]. The crops of the kharif season require a high temperature and a plentiful supply of water, while the crops of the rabi season need cool weather and only a moderate supply of water.

An-other clarification refers to the system of land classification. A number of maps have been drawn by the writer to classify the village fields according to their fertility and productivity. It should be mentioned, however, that no quantitative measurement of fertility can be given, but in the course of his field work, the writer, visited the villages and collected information on soil characteristics, on the availability of irrigation water and on the supply of manures to the crops grown in each field.

(1)In English writings, the kharif season is some times referred to as the season of summer crops and sometimes as the season of autumn crops, because the crops are sown in summer and harvested in autumn. Similarily, the rabi season is some times referred as the season of winter crops and sometimes as the season of spring crops.

Thus it has been made possible by the study of material collected in the course of the field survey work that the village lands have been classified into three categories:-

A- Good quality land

B- Medium quality land

C- Poor quality land

The last clarification refers to the system of irrigation. Roughly speaking 75 percent of the irrigated area of the whole district is fed by canals, 20 percent by wells and 5 percent by other sources including ponds and streams.[1] Canal irrigation is plentiful and wide spread and on the whole the district is irrigated by the lower Ganges canal of Kanpur, Etawah, Bhognipur and Fatehpur branches and their distributaries with minors and offshoots.

The facilities of irrigation by means of wells vary inversely with the depth of water level. The water level is the highest in the tract along the Ganga, where it ranges from 15 to 20 feet. In the central plain it ranges from 20 to 40 feet, while in the Yamuna tahsils it is from 60 to 80 feet or evenmore. Well irrigation is expensive as compared to canal irrigation. Mechanical devices for lifting water are hardly used in the villages. The indigenous methods used for lifting water in the villages are the following:-

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(1) Percentages have been given on the basis of the information collected from the Irrigation's Office, Kanpur.

(i) The Charas or pur (Leather bucket)

It is an indigenous irrigation practice, commonly used in areas with relatively hgih watertable. The water is raised from the well by means of a leather bucket(pur) drawn by pairs of bullocks walking up and down an inclined plane. The subsoil water at this depth is hopelessly inadequate for irrigating the fields. The wells run dry, if worked continuously for six hours. The capacity of the bucket is generally 14-15 gallons and a pair of bullocks on a pur can irrigate about one-third acre in the course of the day.

(ii) The Dhenkli (Lever well)

It is a method used in sandy areas of Kachhar and the Ganga low lands, where the water is very close to the surface and permanent wells can not be made. The depth of temporary well used for it is nearly 10-15 feet, in which about five feet water collects.[1] It consists of a lever, the shore end of which is loaded so as to a little more than counterbalance the weight of the rope and empty earthen or iron pot, and the water is drawn in it onthe long end. Only one man can operate this method. It is also a most economical system of irrigation involving a very small initial cost. This method is used only for small plots of land and generally vegetables or melons are irrigated during the hot dry season. One-fifteenth acre can be irrigated inthe course of the day.

(1) Temporary well is rather a hole, which is locally known as chohs .

(iii) The Rahat (Persian Wheel)

It is very popular in areas with watertable 30 feet or less. It can be applied with advantage to tanks, rivulets and channels, but in this district it is in common use with wells and is only employed for watering the gardens and vegetables grown in the hot dry season as well as for rabi crops. The water is lifted by the wheel in which a number of iron pots of small size are attached and the rahat is drawn by a pair of bullocks. One-third to half an acre of land can be irrigated in the course of the day.

(iv) The Baldeo Balti

This is an indigenous device of this district for liftin water upto a depth of 5 feet. It consists of two large boat-shaped buckets of iron hinged on to a piece of wood on the edge of a water tank or channel.[1] Animal power is used for lifting water. About half an acre of land can be irrigated inthe course of the day.

(v) The Beri (The Swing Basket system)[2]

Two persons, standing face to face hold a closely woven basket or iron basket[3] with the help of the ropes.[4] This basket

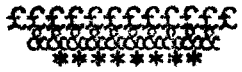
(1) The Channel is known by different names as gool or baha
(2) This system is also called the 'basket lift' system
(3) The local name of the basket is lahri
(4) The ropes are locally known as jhular

scoops water from the pit or depression or pond and empties itself into a channel, which carries the water to the fields. Canal water is also supplied to the high-lying fields by this method. In this case, water is collected into a depression or pit and this system is used. The supply of canal water by this method is known as 'dali' Two gallons of water are lifted up to a height of four feet in one scoop of the basket. This system is cheaper in operation but slower than pur-irrigation. By this process half an acre can be irrigated perday. Tube wells are rare in the district.

Ponds and swamps can not serve as an effective protection against drought, since they are usually shallow and the amount of water in them diminishes rapidly by evaporation in the dry hot season. They are seldom sufficient for more than one watering, and in dry years, when they are more required they fail altogether. The streams are seldom employed for the purpose of irrigation with the exception of the river Isan, which is extensively utilized at some places by the kurmi cultivators, inhabiting its sandy valley, where the construction of well is practically difficult.

Canal water is directly supplied to the low-lying fields by irrigation channels and is spread over the fields by kiari in which the field is divided by little mounds into small rectangular plots and water is allowed to flow into these plots and fill them one after another. Direct supply of canal water to the lowlying fields is known as 'tor' or Katwa irrigation. 'To:-

-irrigation is less expensive than that of dal, as in the former less human labour is required than the latter. The rates of tor-irrigation are half of the dal-irrigation. With tor method two acres of land can be irrigated in a day.



C_H_A_P_T_E_R V

GROUP I : UPLAND PLAINS :

Daheli

Harbaspur

Khajuri

Pitakpur

LAND UTILIZATION IN DAHELI

Location

The village of Daheli lies in Derapur tahsil of the Kanpur district. It is situated in 26°38'N. latitude and 79°52'E. longitude. Located in the upland plain of Pando-Rind tract, the village is bounded by the villages of Itaily in the north, Mal Ka Purwa and Angadpur in the east, Atia Raipur in the south and Barri/or Kaelepur in the west. Its southern boundary is also formed by a very small channel, which is the eastern affluent of the seasonal channel of Chhcha. The Chhcha meanders in a south-easterly direction close to the north-western and western extremity of the village. In years of excessive rainfall, when the Chhcha is in spate, the northern and north-western parts of the village are liable to inundation from this channel. The plain is on the whole level with slight undulation. Seasonal swamps are the common features in the north

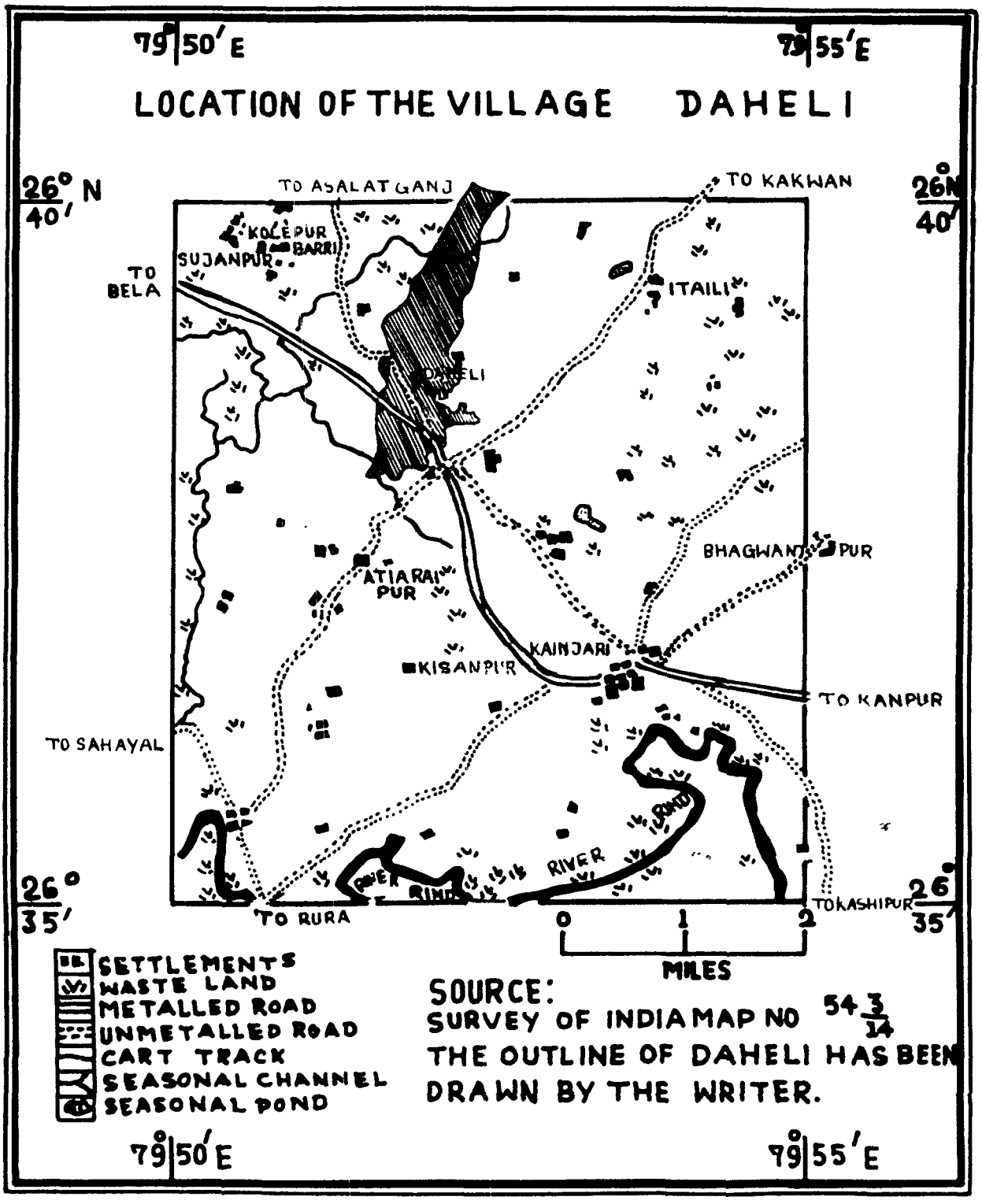

79° 50′ E
79° 55′ E
LOCATION OF THE VILLAGE DAHELI
26° 40′ N
26° 40′
TO ASALAT GANJ
TO KAKWAN
KOLEPUR BARRI
SUJANPUR
TO BELA
ITAILI
DAHELI
BHAGWANTPUR
ATIARAI PUR
KAINJARI
KISANPUR
TO KANPUR
TO SAHAYAL
SAND
RIVER
TOKASHIPUR
26° 35′
TO RURA
0 1 2
MILES
SETTLEMENTS
WASTE LAND
METALLED ROAD
UNMETALLED ROAD
CART TRACK
SEASONAL CHANNEL
SEASONAL POND
SOURCE:
SURVEY OF INDIA MAP NO 54 3/14
THE OUTLINE OF DAHELI HAS BEEN DRAWN BY THE WRITER.
79° 50′ E
79° 55′ E

Fig. 28

of the plain due to the lack of natural drainage. These swamps have now been much silted up and are being utilized for rice cultivation. The total area of the village is five hundred and ninety four acres.

It will be seen from Fig. 26 that the village of Daheli lies at a distance of about a mile from the Bela Road.[1] There is an unmetalled road[2] passing through the heart of the village, which connects Daheli to Belaroad. The village has, therefore, an easy access to the important markets of Rasulabad and Kainjari lying on the same metalled road at a distance of 5 and 8 miles to the west and east of the village respectively. The village is also linked by a cart-track with the markets of Asalatganj at a distance of 4 miles to the north of the village.

Daheli is thus favourably located as regards means of communication and the accessibility to markets has an appreciable influence on the land-use of the village.

Climate

No climatic data are recorded in the village. The data of rainfall for the tahsil head quarters of Derapur

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(1) Belaroad is now metalled road, which was shown in the survey map 54 N/14. An efficient regular bus service is available from Kanpur to Bela-Bidhuna of the Etawah district.

(2) Unmetalled road has been recently constructed by the villagers during the course of their 'Shramdan'.

lying about 19 miles to the south-east of the village have been given in Tables III and IV,[1] and may be taken as close approximation for this village.

TABLE III

Kharif Season 1960 (Derapur)

Months	June	July	August	September	October	Total
Rain fall in inches in the Kharif season, 1960	1.23	11.21	14.46	4.16	10.41	41.47
Rainy days in kharif	2	16	19	7	6	50
Average rain fall in inches[2]	2.47	8.06	10.03	6.13	1.25	27.94

(1) Rain fall data for 1960-61 have been obtained from the tahsil head quarters of Derapur.

(2) The figures of average rain fall in these and other subsequent Tables of rainfall are for over 30 years and have been calculated on the basis of rainfall figures obtained from the Memoirs of the I.M.D., New Delhi.

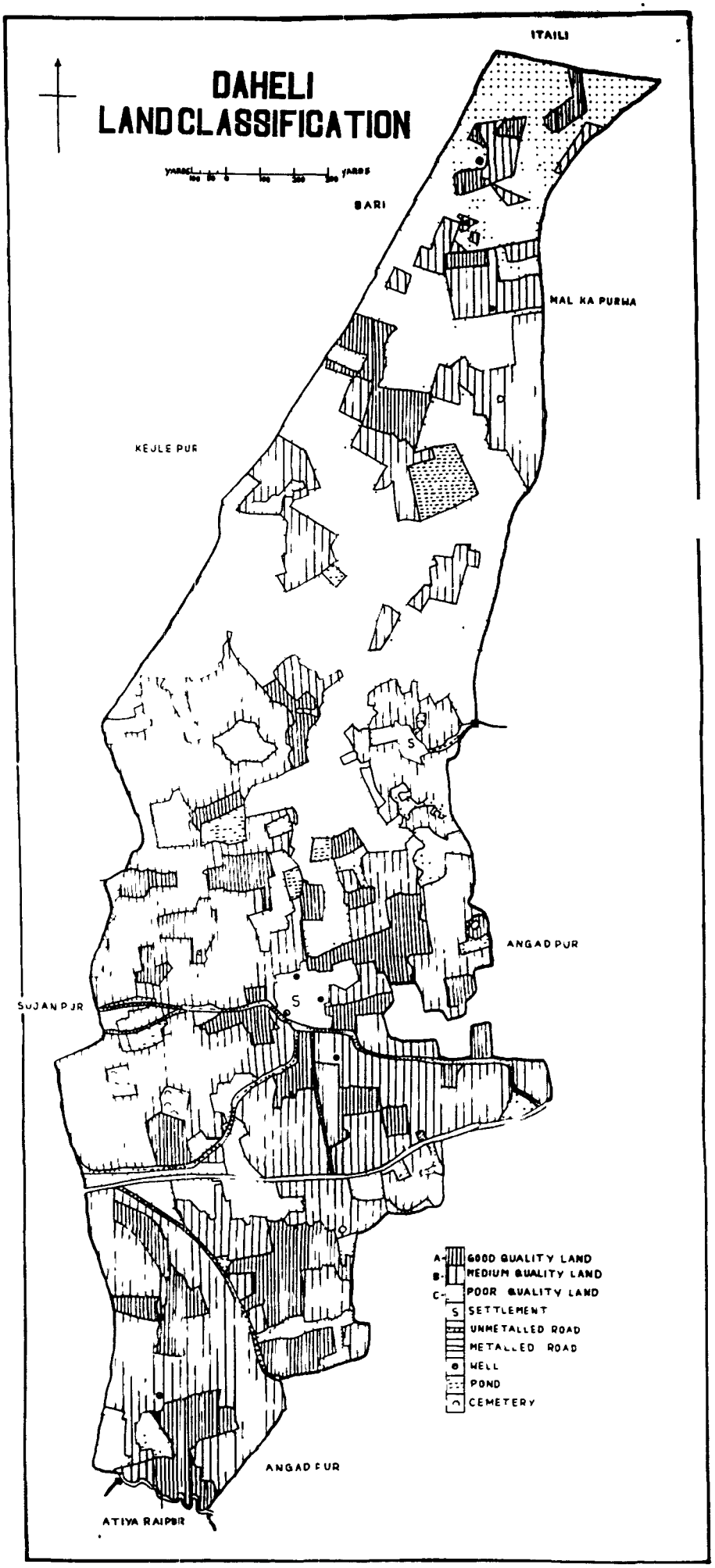
TABLE IV

Rabi Season 1960-61 (Derapur)

Months	November	December	January	February	March	Total
Rain fall in inches in the rabi season, 1960--61	...	...	1.92	1.50	...	3.42
Rainy days in rabi	...	...	5	2	...	7
Average rainfall in inches	0.03	0.18	0.68	0.48	0.26	1.63

Land Classification

The soil of the area in which the village is situated is loamy (Fig.25). The writer has made an attempt to classify the village fields according to their fertility and productivity (see page 57) It will be seen from Fig. 27 that the good quality land (A) possesses loamy soil and is capable of raising two crops a year. The soil of the medium quality land (B) is inferior to that of the good quality land and is less productive than A, as B lands consist of light loam and are usually left fallow during the kharif season and cropped in the rabi season. But, sometimes even


DAHELI
LAND CLASSIFICATION
ITAILI
BARI
MAL KA PURWA
KEJLE PUR
ANGAD PUR
SUJANPUR
ANGAD PUR
ATIYA RAIPUR
A- GOOD QUALITY LAND
B- MEDIUM QUALITY LAND
C- POOR QUALITY LAND
S SETTLEMENT
UNMETALLED ROAD
METALLED ROAD
WELL
POND
CEMETERY

during the kharif, they may be devoted to the mixed crop of millets and pulses. A few patches of medium quality lands (B) also possess clayey loam. These low lying fields, locally known as '*jhabar*' with such soil are entirely reserved for transplanted rice.

The poor quality lands (C) are unutilized due to the presence of *usar* containing a high proportion of injurious salts at or near the surface and these lands are mostly confined to the north of the village.

Irrigation

The area does not possess the facilities of canal irrigation. Wells and ponds are usually the chief sources of irrigation in the village. Irrigation from the wells is carried on by the pur method, while a few fields are watered by ponds with the swing basket method. The area irrigated in the kharif and rabi seasons during the year 1960-61 is shown in Fig. 28.[1] This Fig. also shows the distribution of the wells, which are mostly located in the good quality lands, where the water table lies between 20 and 25 feet.

It will be seen from Table III, that the amount of rainfall in the kharif, season in the year under inquiry was 41.47 inches and was spread over sufficient number of days in

(1) Irrigated areas of the kharif and rabi seasons have been shown by the writer on the basis of his inquiry from the villagers during the course of his field work.

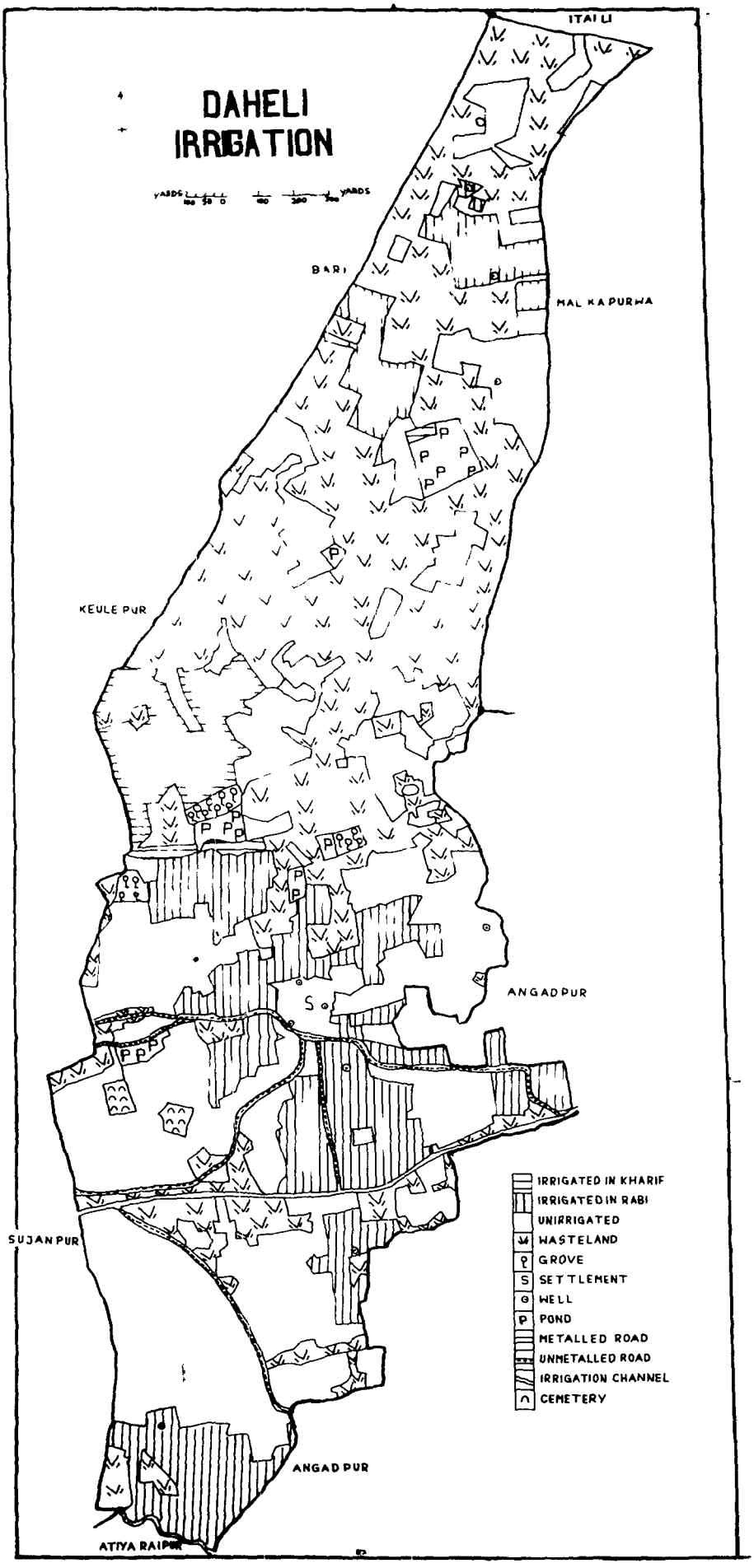

DAHELI
IRRIGATION
ITAILI
BARI
MAL KA PURWA
KEULE PUR
ANGAD PUR
SUJAN PUR
ANGAD PUR
ATIYA RAIPUR
IRRIGATED IN KHARIF
IRRIGATED IN RABI
UNIRRIGATED
WASTELAND
GROVE
SETTLEMENT
WELL
POND
METALLED ROAD
UNMETALLED ROAD
IRRIGATION CHANNEL
CEMETERY

Fig. 28

the months of July, August and October. This amount of rainfall was sufficient for all the kharif crops except transplanted rice, as the amount of the rainfall of the month of September was very low. Thus either in the last week of September or in the first week of October the transplanted rice fields were irrigated by the villagers from the ponds.

Table IV shows that there was no rainfall in the months of November and December but, the amount of rainfall in the months of January and February was adequate. Thus with the exception of a few rabi crops such as wheat and vegetables, none of the crops was irrigated by the wells during the rabi season.

In the years of drought lack of water in the wells and ponds in both the seasons of kharif and rabi makes the problem of irrigation a serious one. The construction of tube wells in the village will serve as an insurance in the period of drought.

Land Utilization

The land use of the village in 1960-61 is shown in Figs. 29 to 32 which are based on the writers field work.[1]

(1) The base map on a scale of 16 inches to a mile, representing the fields and their areas was obtained from the Lekhpal with the permission of Tahsildar of the Derapur tahsil in the district of Kanpur. The village was visited by the Writer in the kharif season of 1960 and the rabi season of 1961 and the use to which each field was being put was recorded on the base map. From these data Figs. 29 to 32 were prepared.

The Table below shows the summary of the proportion of the village lands devoted to various uses in 1960-61.

Table :V

Total area of the Village 594.02 acres

Use of land	Area in acres	Percentage of the total area
Cultivated land[1]	358.19	60.30
Wasteland[2]	194.74	32.78
Groves[3]	3.74	0.63
Settlements	6.25	1.05
Road (Metalled and unmetalled)	14.87	2.50
Grave yard	1.17	0.20
Ponds	14.88	2.51
Seasonal Channel	0.18	0.03
Total	594.02	100.00

It will be seen from the figures of the above Table that 60 per cent of the gross area is arable, 7 per cent is

(1) The cultivated lands include current fallows in the year of inquiry in the kharif and rabi seasons.
(2) Waste lands refer to unproductive lands which are unutilized due to the presence of the high amount of salts.
(3) The groves consist mostly mahua (Bassia latifolia), dhak(Butea frondosa), nim (Melia azadirachta) and babul (Acacia)trees.

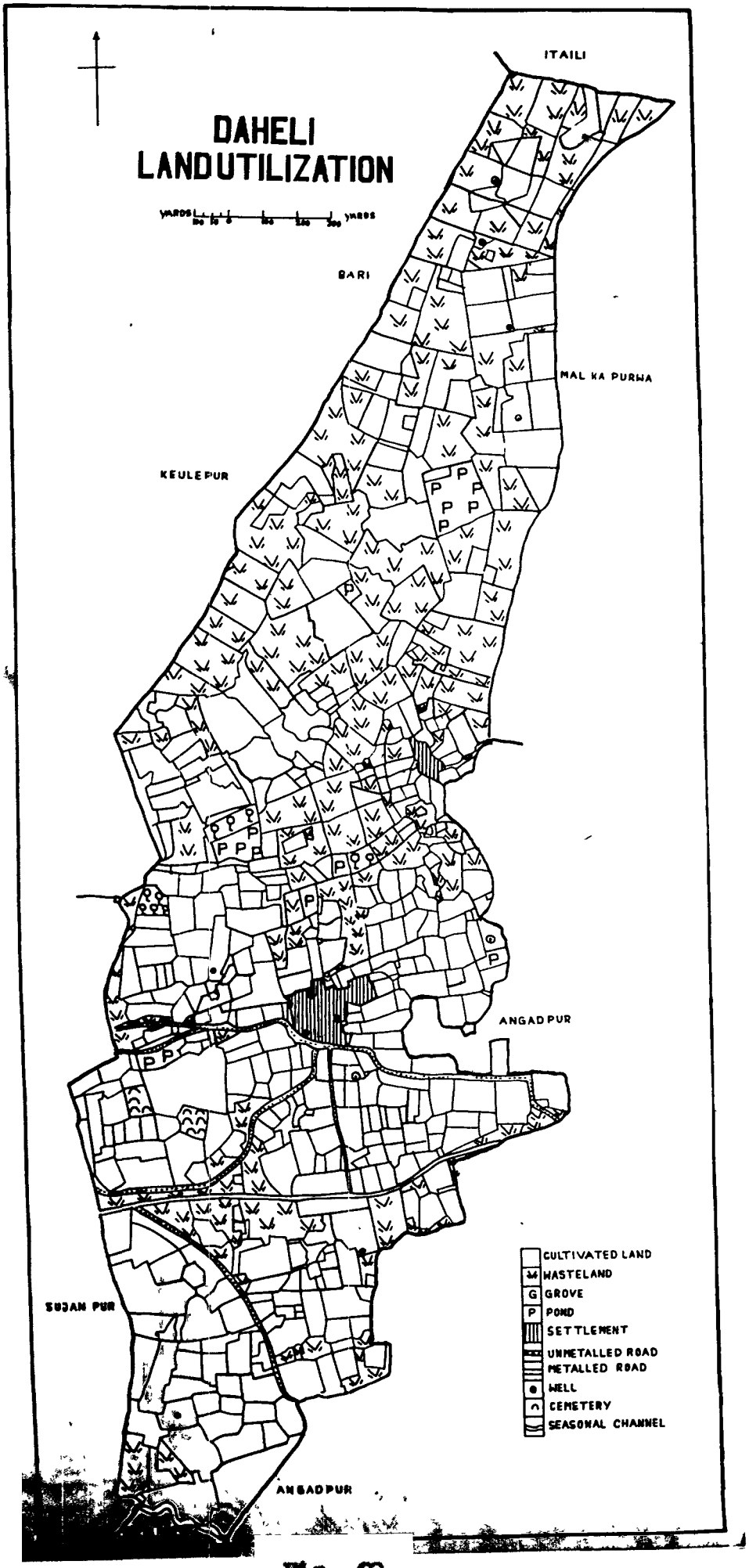

DAHELI
LAND UTILIZATION
YARDS
YARDS
ITAILI
BARI
MAL KA PURWA
KEULEPUR
ANGAD PUR
SUJAN PUR
ANGADPUR
CULTIVATED LAND
WASTELAND
GROVE
POND
SETTLEMENT
UNMETALLED ROAD
METALLED ROAD
WELL
CEMETERY
SEASONAL CHANNEL

Fig. 29

devoted to non agricultural uses and about 33 per cent is unproductive and not utilized. A very small proportion of 0-63 per cent of the gross area is occupied by groves, which are often the source of fuel supply. In the absence of an alternative cheap fuel, the cultivaters burn the cattle dung instead of applying it to their fields. Reclamation of the wasteland of this village is an intricate problem and needs special attention. Area under groves can be increased by reclaming the usar land.

A comparison of Figs. 27 and 29 shows the influence of the quality of the land on the size of the fields. Fields of the good quality lands are very small in size, the fields of the medium quality lands are fairly large but the poor quality lands are larger than that of medium and good quality lands and are some what irregular in shape. They are confined to the north of the village. (Fig. 29). The size of the fields varies from below 0.25 acre to more than 3 acres in the village, which was as follows in 1960-61.

Table VI

Size of fields	Number of fiel of each size	Percentage of the fields of each size to the total No. of the fields
Below 0.25 acre	115	21.0
0.25 acre to 0.50 acre	112	20.4
0.50 acre to 0.75acre	73	13.3
0.75 acre to 1.00acre	65	11.8
1.00 acres to2 acres	96	17.5
2.00 acres to3 acres	46	8.4
Over 3 acres	42	7.6
Total	549	100.0

It will be seen from the above Table that about 54 per cent of the total number of the fields are below 1 acre in size, while the plots of the medium quality land vary between 1 to 2 acres in size and cover an other 18 per cent of the total number of fields, while the percentage of the plots over 3 acres is the lowest.

Land utilization in the kharif season

Thes use of land in the kharif season of 1960 is illustrated in Fig. 30. The following Table represents the area occupied by each crops:-

Table VII

Gross cultivated land 358.19 acres
Net cropped land in the kharif season 192.66 acres

Crops	Area in acres	Percentage of gross cultivated land	Percentage of net cropped land	Total percentage of gross cultivated land	Total percentage of net cropped land
Grain crops:-				50.80	94.43
Millets andPulses	64.32	17.96	33.39		
Maize	47.36	13.22	24.58		
Transplanted rice	42.93	11.99	22.28		
Big Millet	16.42	4.58	8.52		
Bulrush Millet	9.42	2.63	4.89		
Pulses (urd etc)	1.49	0.42	0.77		
Other crops:-				2.99	5.57
San hemp	6.70	1.87	3.48		
Fodder	2.09	0.58	1.09		
Vegetables	1.77	0.49	0.92		
Sweet Potato	0.16	0.05	0.08		
Fallow	165.63	46.21	--	46.21	
Total	358.19	100.00	100.00	100.00	100.00

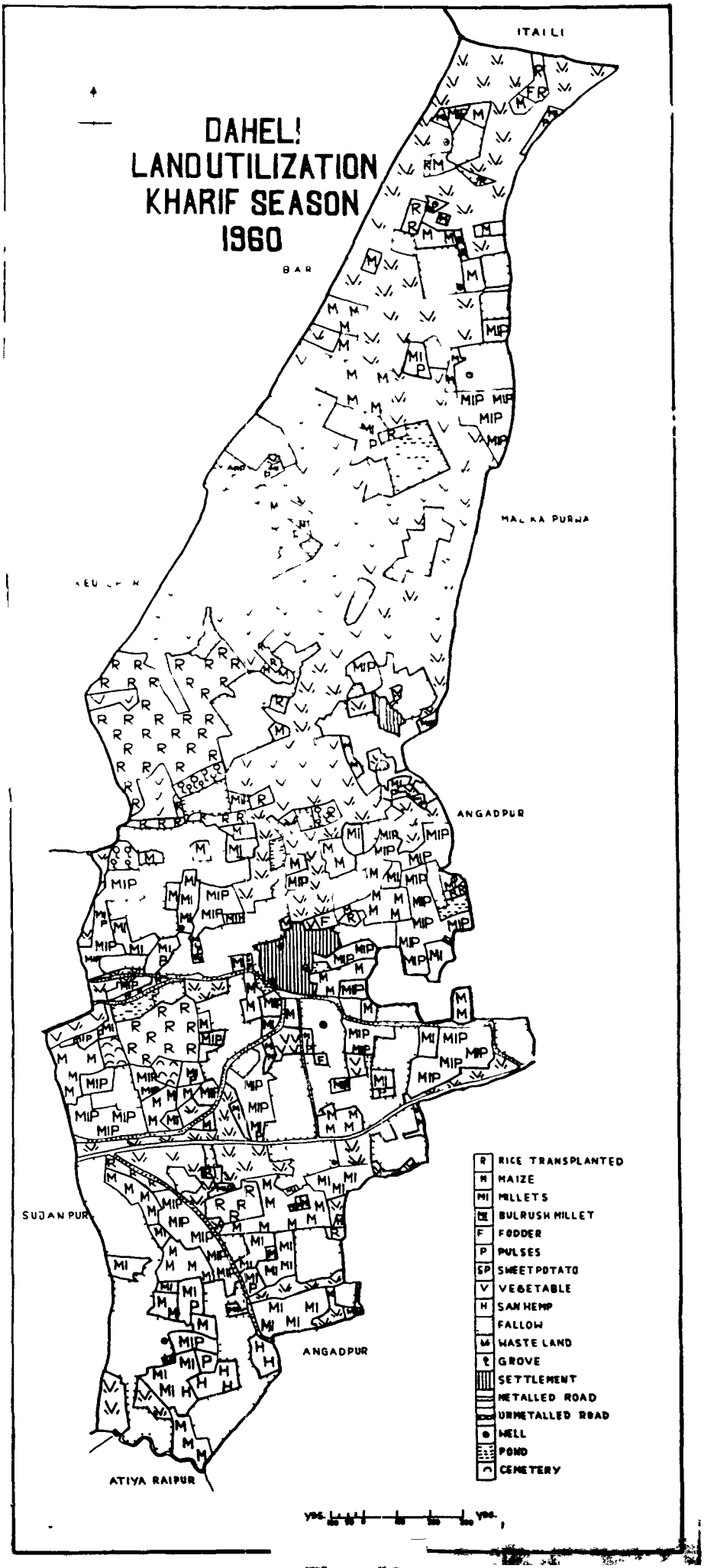

DAHELI
LAND UTILIZATION
KHARIF SEASON
1960
ITAILI
BAR
MALKA PURWA
ANGADPUR
SUJANPUR
ANGADPUR
ATIYA RAIPUR
RICE TRANSPLANTED
MAIZE
MILLETS
BULRUSH MILLET
FODDER
PULSES
SWEETPOTATO
VEGETABLE
SANHEMP
FALLOW
WASTE LAND
GROVE
SETTLEMENT
METALLED ROAD
UNMETALLED ROAD
WELL
POND
CEMETERY

Fig. 30

Table VII shows the proportions of the different cereals. Millets mixed with pulses is the major crop and occupies 33 per cent of the net cultivated area in the kharif season. Maize is the next important crop, which covers one-fourth of the net cropped area and is grown on the good quality land usually by the kachhis,[1] who are skilful cultivators and make the best use of soil by producing the good yield of the crop.[2] It is one of the staple diets of the people. Maize is sown very early in July and ripens in a very shorttime. It matures in September and therefore is of peculiar value, as the early maturity of the crop provides the cultivator and his family with food at a time when the reserves of the rabi grains are running low. Sometimes, instead of waiting till the seed is quite mature, the villagers pick the green cobs, which are sold in the neighbouring village markets of kainjari to be roasted for food.

Other important crops grown in the village are transplanted rice and big millet[3] (shwn as a sole) . No portion of the land is devoted to sugarcane as the vital problem of the cane cultivation is the scarcity of irrigation water. Fodder and vegetables with sweet potato cover only 2 per cent of the net cropped land. The area under vegetables and fodder may be increased with additional facilities of irrigation.

San hemp (Sanai) covers 3.48 per cent of the net cropped area. It is sown with the break of the monsoon and

(1) A class of people, who generally produce vegetables in the gauhan land lying close to the village settlement.
(2) The yield of the maize of this village is 820 lb. per acre.
(3) Jwar refers to Big millet. Its botanical name is 'Sorghum Vulgare'.

has all the good qualities for a green manure crop. It grows very quickly and attains a height of about 4 to 5 feet in a few weeks. Even on poor soils, if they are not swampy, san hemp can be grown well. The plant contains a lot of herbage and does not get woody soon. It decomposes quickly provided the moisture in the soil is not lacking. Its fibre, which is obtained from stalks is also used for making ropes. But the advantage with this crop is that it increases the fertility of of the soil. Sanhemp produces 212.2 maunds of green matter per acre. San hemp plus 45 lb. super phosphate per acre (P_2O_5) produced an additional yield than the yield obtained without manuring.[1] Therefore, the area under sanhemp may be increased so that rice and wheat may be benefited by this crop. Especially in the case of transplanted rice the dhainch-a seeds should be also sown with the break of rains. An advantage with this crop is that it can be grown under adverse conditiohs of drought, waterlogging, salenity etc, without much difficulty.

46.21 per cent of the gross cultivated area is left fallow in the kharif season. These lands are the medium quality lands and without the provision of manures, especially green manures they can not produce two crops a year.

Land utilization in the Rabi-season

The use of the land in the rabi season of 1960-61 is mapped in Fig. 31. The Table No. VIII will show the area occupied by each crop.

(1) Mirchandani, T.J. and Khan, A.R: Green Manuring Series No.6, Indian Council of Agriculture Research, New Delhi.P.11

Table VIII

Gross cultivated area 358.19 acres

Net cropped area in the rabi season 229.76 acres

Crops	Area in acres	Percentage of gross cultivated land	Percentage of net cropped land	Total percentage of gross cultivated area	Total percentage of net cultivated area
GRAIN CROPS:-				59.99	93.52
Wheat	97.41	27.20	42.39		
Wheat & Gram	46.80	13.07	20.37		
Gram & Barley	44.29	12.36	19.28		
Barley	10.53	2.94	4.58		
Gram	10.20	2.85	4.44		
Peas	5.64	1.57	2.46		
OTHER CROPS:-				4.15	6.48
Oilseeds	11.13	3.10	4.84		
Potatoes	2.60	0.73	1.14		
Vegetables	1.16	0.32	0.50		
Continual kharif[1] crops	64.32	17.96	..	17.96	
Fallow	64.11	17.90	..	17.90	
Total	358.19	100.00	100.00	100.00	100.00

(1) Continual kharif crops refer to those crops, which occupy the land in the kharif and the rabi seasons. Such crops are sugarcane and pulse (arhar).

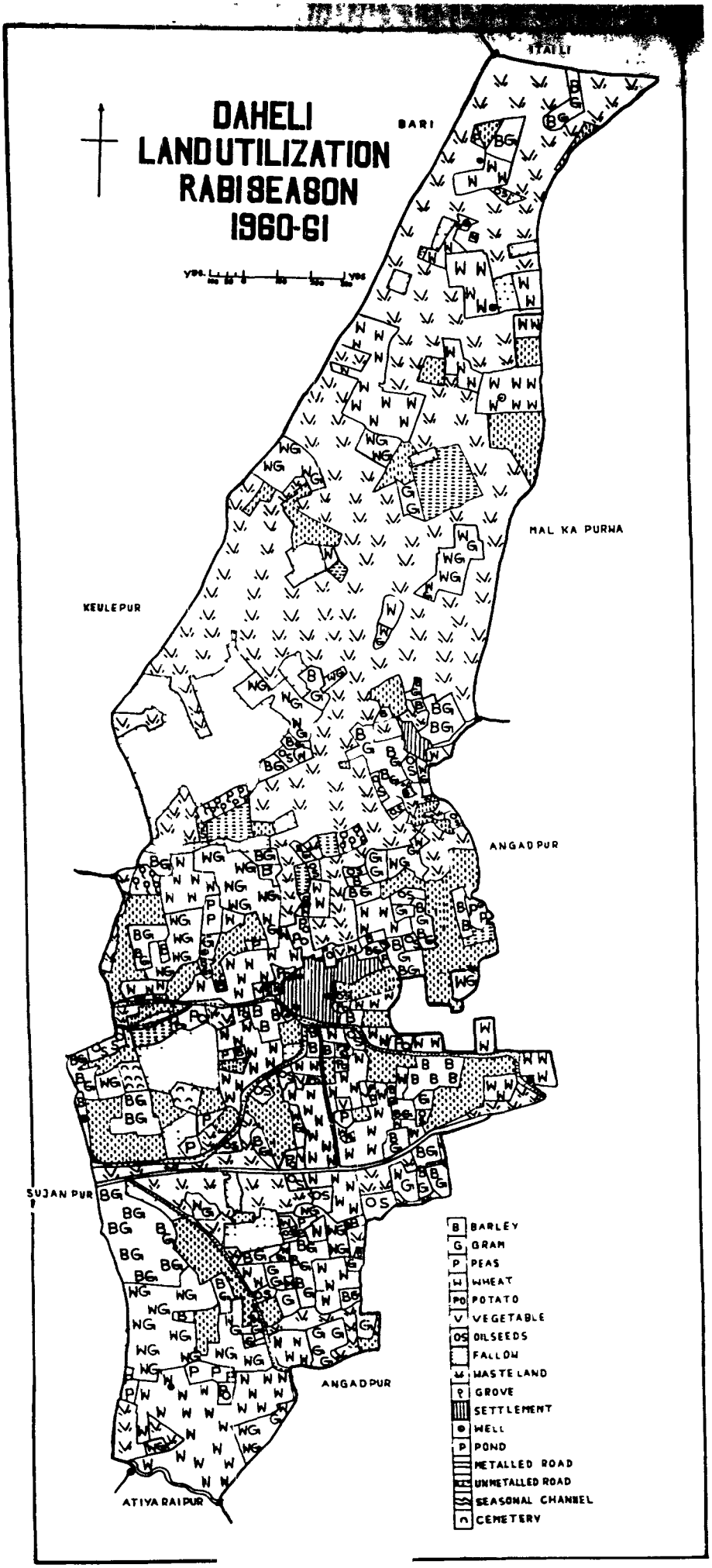

DAHELI
LAND UTILIZATION
RABI SEASON
1960-61
ITAILI
BARI
MAL KA PURWA
KEULEPUR
ANGADPUR
SUJAN PUR
ANGADPUR
ATIYA RAI PUR
B BARLEY
G GRAM
P PEAS
W WHEAT
Po POTATO
V VEGETABLE
OS OILSEEDS
F FALLOW
W WASTE LAND
G GROVE
S SETTLEMENT
W WELL
P POND
M METALLED ROAD
U UNMETALLED ROAD
S SEASONAL CHANNEL
C CEMETERY

Fig. 31

A comparison of Tables VII and VIII shows that the area cultivated in the rabi season is greater than that of the kharif season. The reason for this is that a little less than half of the cultivated land is left fallow during the kharif season, while in the rabi season the entire area with the exception of occasional patches of clayey soil is under crops.

It will be seen from Table VIII that wheat and wheat mixed with gram and gram mixed with barley are the major crops in the rabi season and occupy about eight-tenths of the net cropped land. The most outstanding feature of the rabi season is the practice of mixed cropping. Gram is mixed either with wheat or barley. The mixture of gram with other crops is useful and advantageous, since, with the help of these mixtures, it is possible to maintain the supply of nitrogen in a convenient way on very small holdings. Mixing of these crops is a sort of insurance, against the vicissitudes of weather. Mostly rabi crops of this village are entirely dependent upon rainfall in the months of January and February, as irrigation from wells is only confined to a limited area. If these months are dry, wheat and barley may suffer from drought but gram a leguminous crop, can grow well with only a small moisture supply and a little tillage. Thus the cultivator has a reasonable prospect of getting something. Peas occupy only 2.4 per cent of the net cropped land. Oil seeds (Lin-seeds, mustard or <u>marson</u>) sown as a sole crop, cover a very small area of 5 per cent. The area under oil seeds has been

reduced due to per haps, greater demand for cereals and generally cultivators produce these oilseeds along with wheat and barley in different rows. Potatoes are grown mainly for home consumption.

With the help of manures and irrigation facilities, the area under potatoes can be increased to an appreciable extent atleast on the good quality lands lying close to the village. The increase in the acreage of potatoes could help the villagers not only in earning some cash but also in obtaining a higher return of the following maize crop. The rotation of potatoes with the maize would build up the fertility of the good quality lands.

Double cropped land

The total area cropped twice in the year 1960-61 was 64.23 acres or 17.93 per cent of the gross cultivated land. The land, which was cropped twice in the year is shown in Fig-32. The double cropping is possible every where on the medium quality lands except a few patches of clayey depressions or *jhabar* area by providing the facilities of irrigation, manures and by cultivating early maturing leguminous crops in the kharif season.

During the visit to the village in 1960-61, the writer consulted the villagers about the rotation of the crops practised by them. The common rotation is most easily recognised in the medium quality lands suitable for either kharif or rabi.

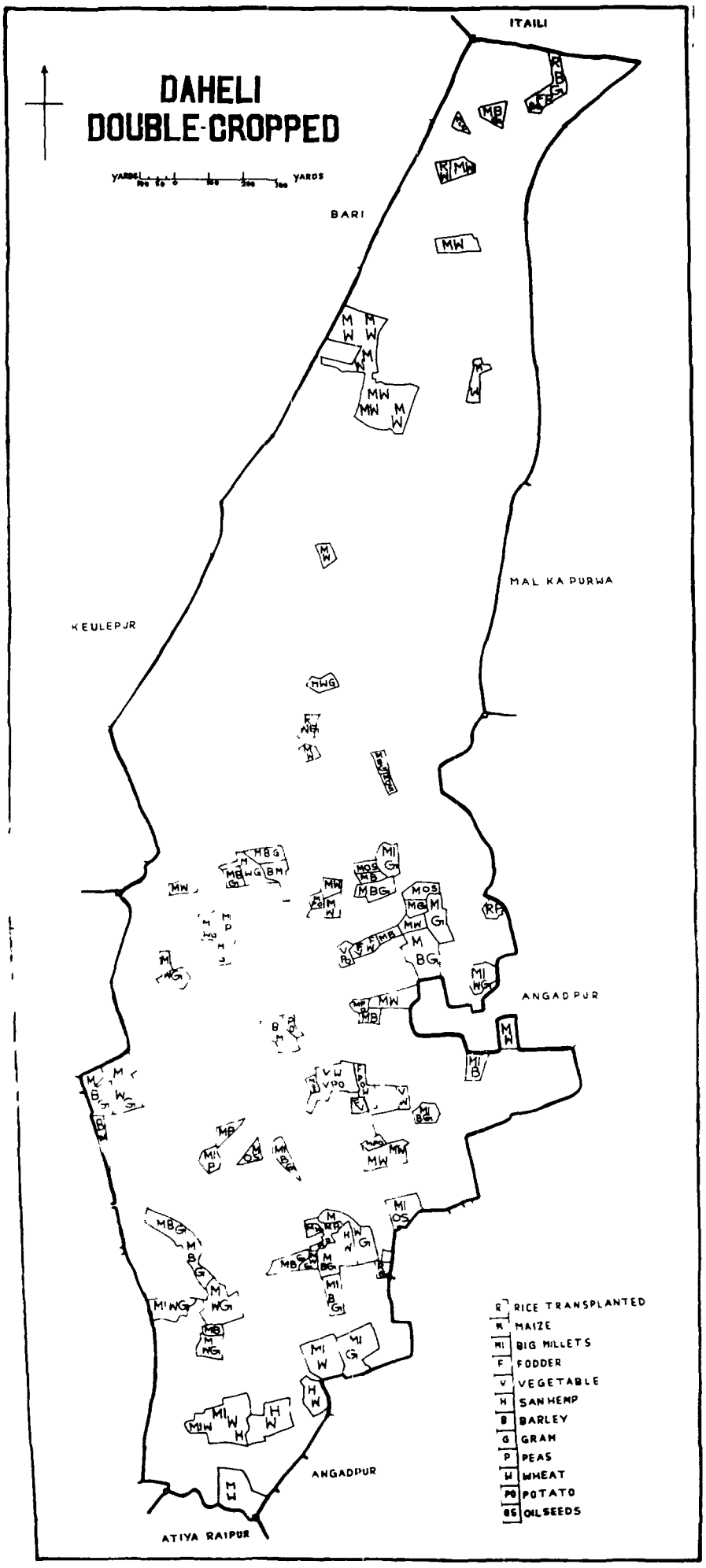

DAHELI
DOUBLE-CROPPED
YARDS
ITAILI
BARI
MAL KA PURWA
KEULEPJR
ANGADPUR
ANGADPUR
ATIYA RAIPUR
R RICE TRANSPLANTED
M MAIZE
MI BIG MILLETS
F FODDER
V VEGETABLE
H SANHEMP
B BARLEY
G GRAM
P PEAS
W WHEAT
PO POTATO
OS OILSEEDS

Fig. 32

In the case of these lands the rules follwed over the greater part of the village are:- (i) a field is devoted to a kharif crop in one year and a rabi crop in the next. (ii) either the kharif or the rabi crop should be wholly or partially pulse, so that a crop of pulse is grown at least once in two years. Thus a field is devoted in the first year to big millet, pulses (arhar or urd) and in the second year to wheat, in the third year it will again bear a kharif crop which may be as before millet as a sole crop or mixed with pulses. In the last case it would not be considered proper in ordinary cases to grow wheat in the fourth year, wheat mixed with gram or barley mixed with gram would be preferred. But in the heavily manured home lands the normal rotation is generally neglected, as the supply of plant food is maintained by manuring. On the good quality land, which is devoted to double cropping, a grain crop in the kharif is followed by another grain or pulse crop in the rabi. No rotation is practised generally on the patches of clayey soil or jhabar lands, which are devoted to transplanted rice, but some cultivators usually grow gram or peas in the rabi, when the land is fit for sowing, so that a few fields of rice bear a crop of pulse at least once in three years. The field of pulse is small but it costs little beyond the seed and the cultivators hold that the pulse benefits the succeeding rice crop.

The inclusion of cover crops(e.g.,creeping pulses) in the rotation can provide protection to the soil and help in building its fertility. The practice of cultivating green manure crops in the kharif season, instead of leaving the land fallow,

can also prove beneficial.

Land use and Population

Table IX shows the totals for various categories of lands in the village and the per capita shares of the villagers in these lands.

Table IX

Total population of the Village[1] — 477

	Total area of the village	Total available land for cultivation	Net cropped land in the kharif season	Net Cropped land in the rabi season	Total cultivated land both of kharif & rabi	Double cropped land
Area in acres	594.02	358.19	192.66	229.76	422.42	64.23
Land per head of population	1.25	0.75	0.40	0.48	0.88	0.13

It will be clear from the above Table that the percapita figure of arable land in the village comes up to 0.75

(1) Data based upon the personal survey. Total population of the village here represents the actual number of persons, who have their fields in the village of Daheli and, therefore, depend upon the produce of the village.

acre only. But in the kharif and rabi season per head share of land is reduced to 0.40 and 0.48 acre respectively. The per capita cultivated land in the rabi is a little higher than that of kharif as the proportion of land left fallow in the rabi is comparatively smaller than that of kharif season. Table IX further shows that the per capita cultivated land both of kharif and rabi is 0.88 acre, that is, the amount of cultivated land supporting one person in Daheli is only 0.88 acre.

The significance of the pressure of population on land can be fully appreciated, if the occupations of the villagers are considered. 437 persons or about 92 per cent of the total population, are entirely dependent upon the land, while 38 persons or 8 per cent of the total population consist of secondary rural population, which depend upon the primary rural population through ancillary services.[1]

The main cultivators are the kachhis, who hold the good quality land in the village and consequently pay high rents. They also produce the highest yields of different crops from the fields by applying chemical fertilizers, cake and compost to their lands.

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(1) The rural population is divided into 3 groups:(a) Primary rural-those people and their dependents, mainly formers dependent directly on the land for their living;(b) secondary rural-those people with their dependaints existing to provide essential services for the primary rural; and (c) adventitious-those people who live in rural areas by choice rather than by necessity. The third group of adventitious population is absent not only from this village but also from all the villages. Thus only two groups have been taken into consideration for the study of population.

The standard of living of the people, as observed by the writer, is above the average. Village is self-sufficient in its produce. The potential productivity may further be increased by reclaming the wastelands. The following Table shows the potential production units of the village.[1]

Table X

Average Yield per acre of good farm land= 980 lb.
= I P.P.U.

Types of Land	Area in acres	Average Yield in lb per acre	Productivity rating per acre	Number of P.P.U.
Good Quality land (A)	64.23	1720	1.8	115.61
Medium Quality land (B)	293.96	980	1.0	293.96
Poor Quality land (C)	194.74	..	..	..
Total	552.93			409.57

(1) A potential production unit may be defined as the potential production of one acre of good average farm land under good management. It is not intended to be a fixed or absolute unit, hence the insertion of 'potential.' It is intended to be used to help in comparing the potential production of land of different types. (Stamp, L.D., applied Greography=The classification of land, (London, 1960), p.113.

It will be seen from the Table No. X that 410 P.P.U. are obtained from 552.93 acres of culturable land. The poor quality land covers about 30 per cent of the culturable land, if it is reclaimedand converted into the medium quality land, P.P.U. of this village can easily be increased.

X----------X

LAND UTILIZATION IN HARBASPUR

Location

The village of Harbaspur lies in Kanpur tahsil of the district. It is situated in $26^{0}18'$ N. lat, and $80^{0}16'$ E long. Located in a well-drained level plain of the Pando-Rind tract, it is bounded by the villages of Bidhnu and Kherse in the north, Kishanpur Majhawan in the east, Katherua and Garhewa Majhawan in the south and Kathara in the west. The total area of the village is 448.52 acres.

It will be seen from Fig. 33 that Harbaspur lies close to the metalled road that runs from Kanpur to Hamirpur and passes through the villages of Bidhnu, Patara and the tahsil headquarters of Ghatampur. Bidhnu lies about a mile to the north of the village, while Patara and Ghatampur lie seven and twelve miles to the south of the village respectively. There is also a

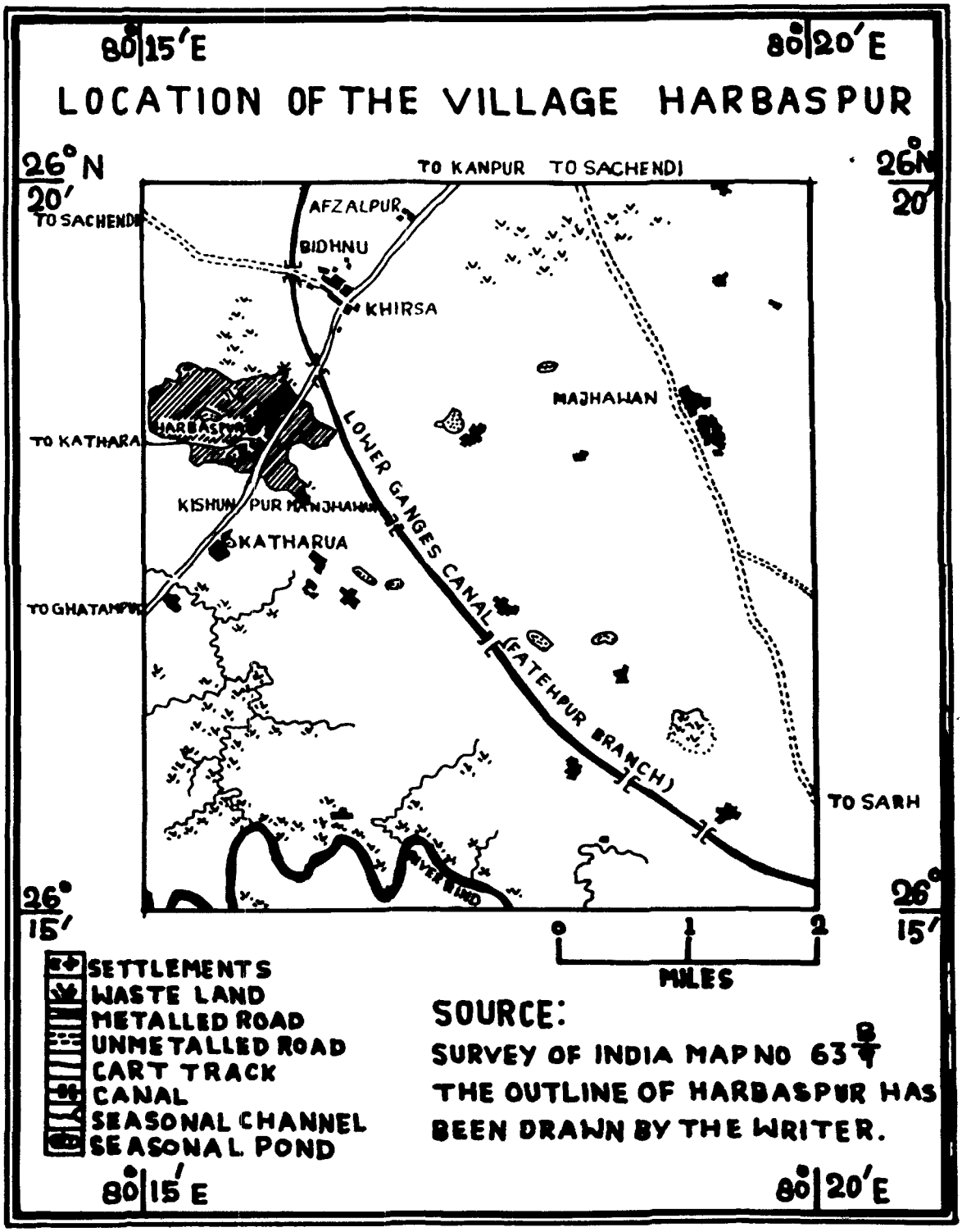
80°15'E
80°20'E
LOCATION OF THE VILLAGE HARBASPUR
26°20' N
26°15'
TO KANPUR
TO SACHENDI
AFZALPUR
BIDHNU
KHIRSA
MAJHAWAN
HARBASPUR
TO KATHARA
KISHUNPUR MANJHAWAN
KATHARUA
TO GHATAMPUR
LOWER GANGES CANAL (FATEHPUR BRANCH)
TO SARH
0 1 2
MILES
SETTLEMENTS
WASTE LAND
METALLED ROAD
UNMETALLED ROAD
CART TRACK
CANAL
SEASONAL CHANNEL
SEASONAL POND
SOURCE:
SURVEY OF INDIA MAP NO 63 P/7
THE OUTLINE OF HARBASPUR HAS BEEN DRAWN BY THE WRITER.

Fig 33

cart track, which runs through the heart of the village and joins Kathara railway station on the Kanpur-Banda loop of the Central Railway, which lies three miles in the west of the village.

Harbaspur is thus favourably located as regards means of communication and access to markets and it also enjoys good facilities of regular bus and train services and therefore, is accessible through out the year. It will be seen later in this chapter that accessibility to market has an appreciable influence on the land-use of the village.

Climate

No climatic data are recorded in the village. The data of rainfall for Kanpur, which is about 14 miles to the north of the village, have therefore been given in Tables XI and XII and may be taken as close approximation for this village.

Table XI
Kharif Season 1960 (Kanpur)

	MONTHS					
	June	July	August	September	October	Total
Rainfall in inches in the kharif season, (1960)	1.30	10.17	8.47	2.13	10.85	32.92
Rainydays in kharif, (1960)	4	13	12	3	5	37
Average rainfall in inches	2.43	9.01	9.10	5.42	1.27	27.23

Table XII[1]

Rabi Season 1960-61(Kanpur)

	MONTHS					
	November	December	January	February	March	Total
Rainfall in inches in the rabi season, (1960-61)	...	...	1.73	0.94	...	2.67
Rainy days in rabi,(1960-61)	...	...	5	4	...	9
Average rainfall in inches	0.03	0.31	0.62	0.56	0.28	1.80

Land Classification

The soil of the area in which the village is situated is mainly loamy (Fig.25). On the basis of field work done by the writer, an attempt has been made to classify the village fields according to their fertility and productivity(see page 57 and Fig. 34).

The soil of the good quality lands(A)varies from loam to heavy clayey-loam and is either capable of producing two crops a year or is devoted to sugarcane.

(1) The data of rainfall for the kharif and rabi seasons of 1960-61 have been obtained from the headquarters of the district Kanpur.

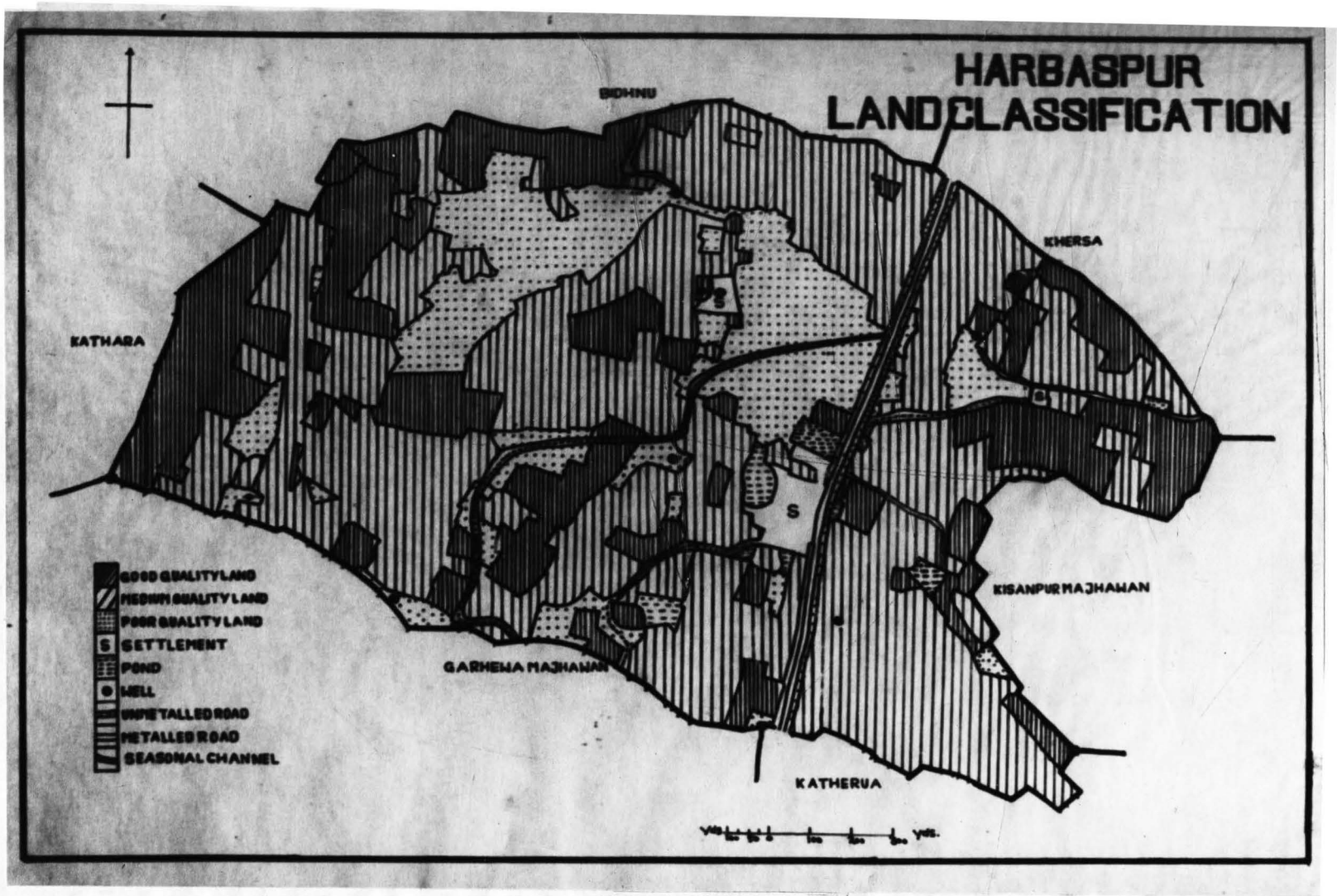
HARBASPUR
LAND CLASSIFICATION
BIDHNU
KHERSA
KATHARA
S
S
KISANPUR MAJHAWAN
GARHEWA MAJHAWAN
KATHERUA
GOOD QUALITY LAND
MEDIUM QUALITY LAND
POOR QUALITY LAND
SETTLEMENT
POND
WELL
UNMETALLED ROAD
METALLED ROAD
SEASONAL CHANNEL

Fig. 34

The soil of the medium quality lands (B) is from light loam to sandy loam and is less productive than A. B lands are usually left fallow in the kharif season and cropped in the rabi season, but some times during the kharif season they may be given to pulses mixed with millets. Some patches of loamy clay are confined to the east of the village and are devoted to transplanted rice.

The poor quality lands (C) are rendered unproductive due to the presence of salts in undesirable quantities.

Irrigation

The main sources of irrigation in the village are canals and wells. The area irrigated in the kharif and rabi seasons during the year 1960-61 is demarcated in Fig. 35.[1] The Dalalpur minor of the Fatehpur branch of the Lower Ganges canal irrigates mostly north-eastern and eastern part of the village. The fields are generally watered by the swing basket method. As the water available is at a lower level than the level of the field, therefore it is raised by a closely woven basket held at the ends by ropes. Wells are mostly located in the good quality lands. The depth of the wells is between twentyfive and thirty feet. Irrigation from the wells is carried on by the nur method. Generally the cultivators prefer irrigation by

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(1) The irrigated area has been demarcated on the basis of information obtained by the writer during his visit to the village in the kharif and rabi seasons.

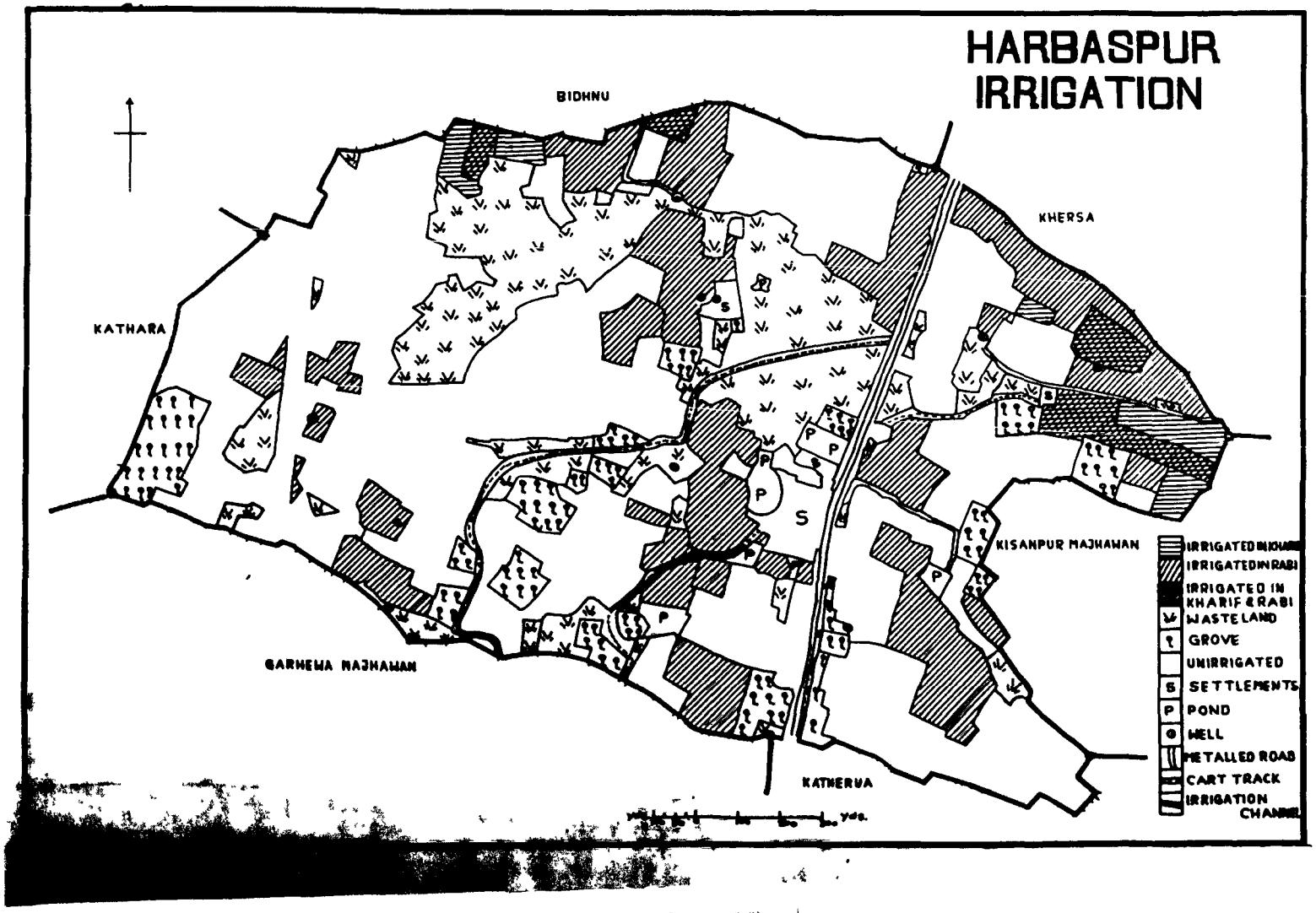
HARBASPUR
IRRIGATION
BIDHNU
KHERSA
KATHARA
KISANPUR MAJHAWAN
GARHEWA MAJHAWAN
KATHERVA
IRRIGATED IN KHARIF
IRRIGATED IN RABI
IRRIGATED IN KHARIF & RABI
WASTE LAND
GROVE
UNIRRIGATED
SETTLEMENTS
POND
WELL
METALLED ROAD
CART TRACK
IRRIGATION CHANNEL

Fig. 35

canal water as compared to well as its cost is less vide Table in the footnote.[1]

An examination of Table XI reveals that the total rainfall in the kharif season in 1960 was 32.92 inches and was spreadover sufficient number of days in the months of July and August. This amount of rainfall was adequate for the kharif crops, with the result, none of the kharif craps except sugarcane and rice bhadoi was irrigated. Sugarcane and rice were irrigated in the month of June. But the amount of rain fall for the month of October, was 10.85 inches or more than the average. This heavy amount of rain, not only damaged the kharif crops but delayed the sowing of rabi crops also. It will be seen from Table XII that the months of November and December are dry. Some of the fields devoted to sugarcane and vegetables were irrigated in the month of December. However, January had 1.73 inches of rain which was of a great benefit to those crops, which were not irrigated in the month of December. The low lying fields, in which transplanted rice was raised, needed no irrigation and were dependent entirely upon rainfall.

Land Utilization

The use of land in the village in 1960-61 has been represented in Figs. 36 to 39, which are based on the writer's

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(1) A comparative cost of irrigation by the three methods(well irrigation, canal(lift) irrigation and cahal (Tor) irrigation) has been computed by the writer for the village and the same estimate is generally valid in the case of other villages. The wages of labourer are taken as Rs. 1.75 np. and 25 np. refreshment(chabena)aday. The area to be irrigated is presumed to be one acre of barley or wheat.

p. 131

Foot note (Contd.)

TABLE

Source of Irrigation	Height to which water is lifted (ft)	Area irrigated in one day (acre)	Extra expenses wear and tear of well and implements	Charges of canal-water per acre	Total number of working days to irrigate one acre	Cost of labour				Total cost in (Rs. RP.)
						Bullocks		Men		
						Per day	Total	Per day	Total	
			Rs. RP.			Rs. RP.	Rs. RP.	Rs. RP.	Rs. Rp.	
Non Masonry well worked by one pair of bullocks	15	1/3	8.00	...	3	3.00	9.00	6.00 *	18.00	35.00
Masonry well worked by one pair of bullocks	15	1/3	12.00	...	3	3.00	9.00	6.00 *	18.00	39.00
Canal Lift irrigation (Dal)	3	1/2	3.00	6.00	2	...	...	10.00 **	20.00	29.00
Canal irrigation by channels (Tor)	...	2	...	12.00	1/2	...	...	2.00 ***	1.00	13.00

* Three men are supposed to work per day. (Two men work with the Pur and one man watches the distributing of water.

** Five men are supposed to work per day. (Two men work at a time and after a while they are replaced by an other group of two men, one man watches water course and distributing of water in the field.

*** One man is supposed to work for distributing the water in the field.

.....

field work in the village.[1] The following Table gives a summary of the proportions of the village lands of Harbaspur devoted to various uses in 1960-61.(Fig. 36)

Table XIII

Total area of the village--448.52 acres

Use of Land	Area in acres	Percentage of the total area
Cultivated land	327.88	73.09
Wasteland	69.80	15.57
Groves[2]	29.01	6.47
Settlement	6.07	1.35
Road	10.62	2.37
Pond	5.01	1.12
Irrigation channel	0.13	0.03
Total	448.52	100.00

It will be seen from the above Table that 73 percent of the total land is under plough, 5 percent is devoted

(1) A base map on a scale of 16 inches to a mile, showing the fields and their areas, was obtained from the Lekhpal of the village concerned. The village was visited by the writer in the kharif and rabi seasons of 1960-61 and the use to which each field was being put was recorded on the base map. From these data Figs.36 to 39 were prepared.

(2) Groves consist of mango, Jamun(Eugenia Jambolana) Imli(tamarindus) and mahua(Bassia Latifolia)as the fruit trees and nim(Melia azadirachta)pipal(Bo-tree)Shisam(Dalbergia sisso)as the non-fruit trees. Mangoes and jamun are items in the food of the villagers,when their season is on.

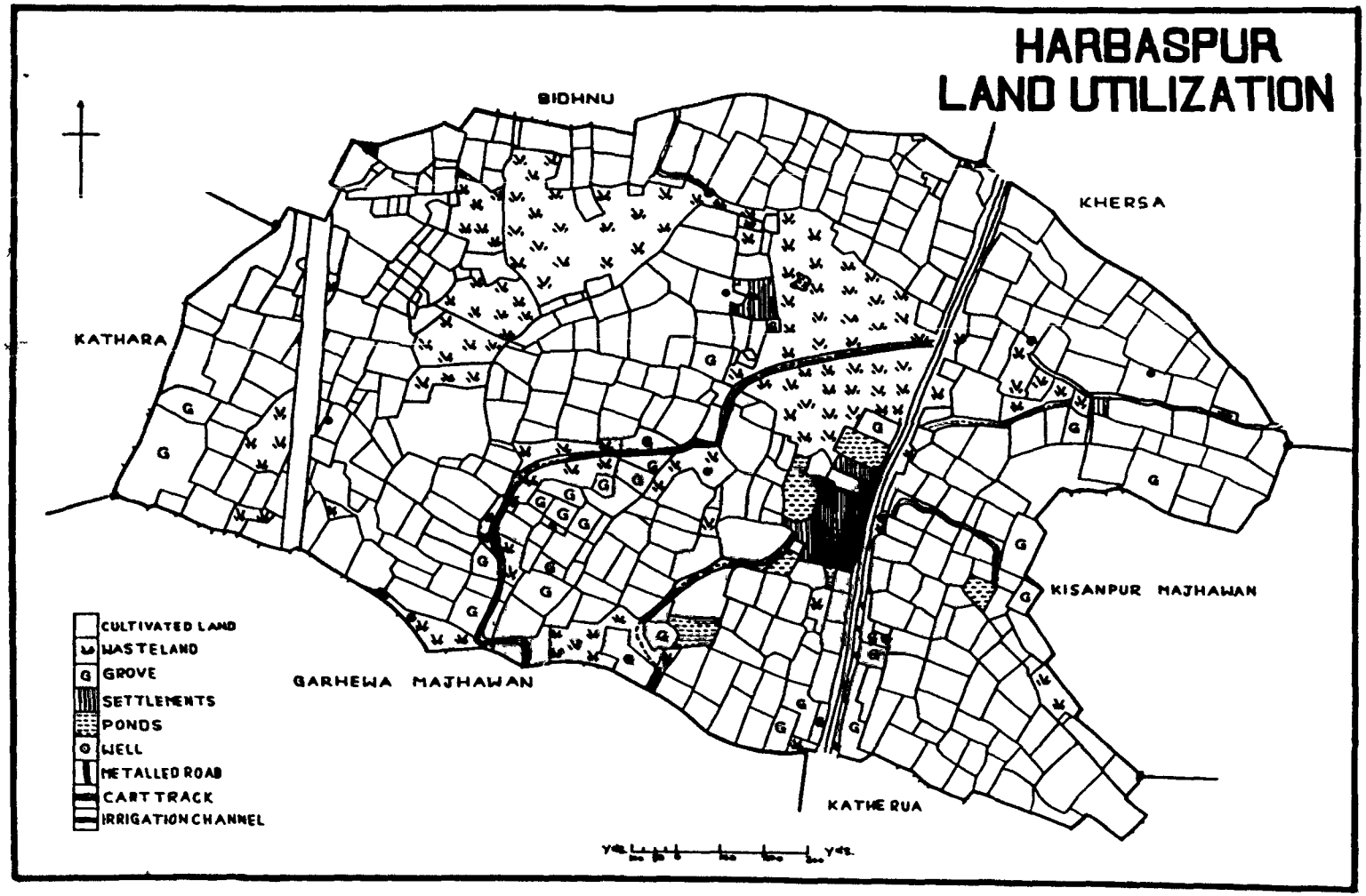
HARBASPUR
LAND UTILIZATION
BIDHNU
KHERSA
KATHARA
KISANPUR MAJHAWAN
GARHEWA MAJHAWAN
KATHERUA
CULTIVATED LAND
WASTELAND
GROVE
SETTLEMENTS
PONDS
WELL
METALLED ROAD
CART TRACK
IRRIGATION CHANNEL

Fig. 36

to non-agricultural uses, while a little more than 15 per cent is not utilized. Some patches of dhak (Butea frondosa) and thorny bushes of karil are common in the wasteland, which are used chiefly for fuel. 6 per cent of the total area is classified as groves. The cultivated fields are rectangular in shape and small in size. The size of the various quality of lands is as follows:--

Table XIV

Size of fields	Number of fields of each size	Percent of the fields of each size to the total number of the fields
Below 0.50 acre	125	27.9
0.50 to 1.0 acre	183	40.8
1.0 to 2.0 acres	106	23.7
over 2.0 acres	34	7.6
Total	448	100.0

It will be seen from the above Table that about 68 per cent of the total number of the fields are up to 1 acre in size, while the plots of medium quality lands vary between 1 to 2 acres and cover another 24 per cent of the total number of the fields, only 3 per cent of the total number of fields are over 2 acres in size. Some of the fields vary from 5 to 15 acres in size and they are utilized for grazing purposes.

A comparison of Figs. 34 and 36 shows a close relation ship between the quality of land and the size of the

fields. The fields of the good and medium quality lands are usually small in size, while the fields of the poor quality lands is relatively large.

Land Utilization in the kharif season

Fig. 37 shows the use of land in the kharif season of 1960 and the area occupied by each crop in this season is given in Table XV.

Table XV

Gross cultivated land ---- 327.88 acres.
Net cropped area in the kharif season ---- 171.83 acres.

Crops	Area in acres	Percentage of gross cultivated land	Percentage of net cropped land	Total percentage of gross cultivated land	Total percentage of net cropped land
GRAIN CROPS:-				48.36	92.25
Rice	74.65	22.77	43.44		
Millets & Pulses	67.25	20.51	39.14		
Big millets	8.02	2.45	4.67		
small millets	2.10	0.64	1.22		
Maize	6.51	1.99	3.79		
OTHER CROPS:-				4.05	7.74
Sugarcane	5.92	1.80	3.45		
Sweet potato	2.65	0.80	1.54		
Vegetables	1.11	0.33	0.65		
Sanhemp	0.28	0.08	0.16		
Oil seeds	0.05	0.01	0.03		
Fodder	3.29	1.03	1.91		
Fallow	156.05	47.58	..	47.59	
Total	327.88	100.00	100.00	100.00	100.00

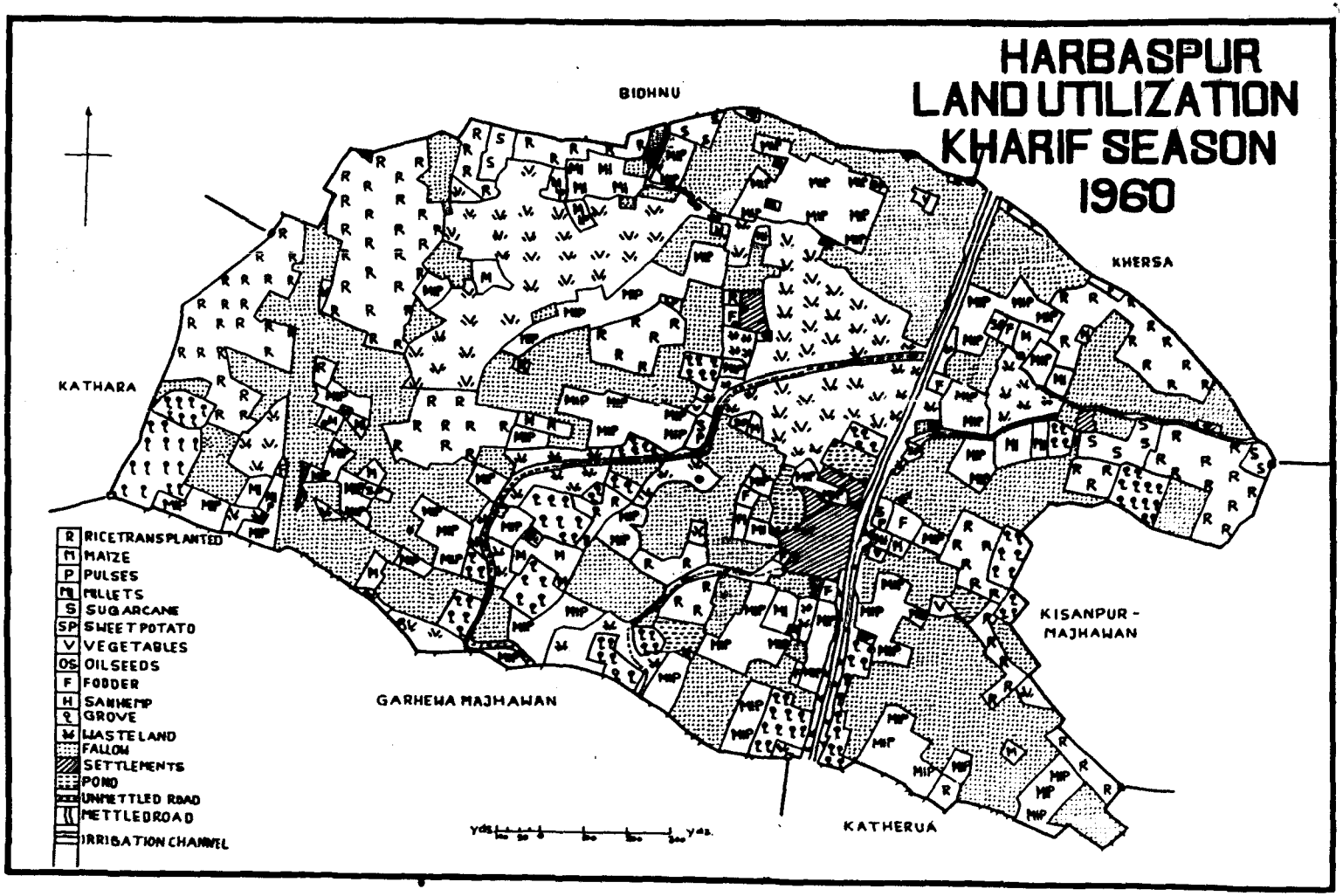
HARBASPUR
LAND UTILIZATION
KHARIF SEASON
1960
BIDHNU
KHERSA
KATHARA
GARHEWA MAJHAWAN
KISANPUR -
MAJHAWAN
KATHERUA
R RICE TRANSPLANTED
M MAIZE
P PULSES
Mi MILLETS
S SUGARCANE
SP SWEET POTATO
V VEGETABLES
OS OILSEEDS
F FODDER
H SANNHEMP
G GROVE
W WASTE LAND
FALLOW
SETTLEMENTS
POND
UNMETTLED ROAD
METTLED ROAD
IRRIGATION CHANNEL
Yds.
Yds.

Fig. 37

It will be seen from Table XV that a little over nine-tenths of the net cultivated area in the kharif season is devoted to grain crops. The reason for the dominance of grain crops in the land use of the village is that the grain crops of the kharif season provide the cultivator with food until the next rabi horvest is ready. Thus the cultivator devotes a large part of his cultivated land to grain crops to ensure food for himself and his family. Rice is the major kharif crop and occupies a little more than two-fifths of the net cropped area. Fig. 36 shows that cultivation of rice is widely confined to the north-west and east corners of the area of the village, where patches of clayey loam are suited for its cultivation. The rice is, either, sown broad cast or sown in nurseries, then transplanted into lowlying fields in regular rows.[1] Next in importance to rice, is millets mixed with pulses. It occupies 39 percent of the net cropped land. Other important crops are big and small millets and maize. Sugarcane covers about 3 per cent of the net cropped land and occupies the good quality land in the village. Sugarcane requires careful cultivation and is sown in the month of March when the temperature is sufficient for the growth of the crop but the low rainfall makes irrigation necessary. From the time of sowing to the out break of the monsoon the crop requires waterings and hoeing (khudai)[2]. The crop matures by the

---

(1) Broad-cast rice is locally known as 'bhadoi or kuari', while transplanted rice is known as 'agahani' and its quality is superior to that of bhadoi or kuari'

(2) The local adage says "Teen kiari terah gaoe, tab dekho ookhi ke po
The meaning is: Inorder to get substantial yield of sugarcane three waterings and thirteen hoeings are essential.

middle of January but cutting begins usually in the months of November. It is raised partly for cash, although for this the cultivator has to wait for about a year from the time of sowing. The cane grown in this village is thin and is quite different from the thick cane of improved varieties in thewestern districts of Uttar Pradesh. The outturn of the crop estimated in terms of 'gur' was 2400 lb. per acre in the year of inquiry. The cultivators sell 'Gur' in the neighbouring bi-weekly market at Bidhnu and Patara. Sweet Potato, and fodder, together cover only 4 percent of the net cultivated land. Vegetables, san hemp and oil seeds together occupy an insignificant proportion.

It will be further seen from Table XV that about 48 per cent of the total cultivated land lies fallow in the kharif season. These lands may be devoted to green manures such as san hemp.

Land utilization in the Rabi season

The use of land in the rabi season of 1960-61 is mapped in Fig. 38. The area occupied by each crop in this season is shown in Table XVI.

It will be seen from Table XVI that nearly eight-tenths of the net cropped land in the rabi season is occupied by wheat, barley mixed with gram, wheat mixed with barley and wheat mixed with gram. Wheat alone occupies four-tenths of the net cropped area, while the area under barley, sown as a sole crop, is insignificant.

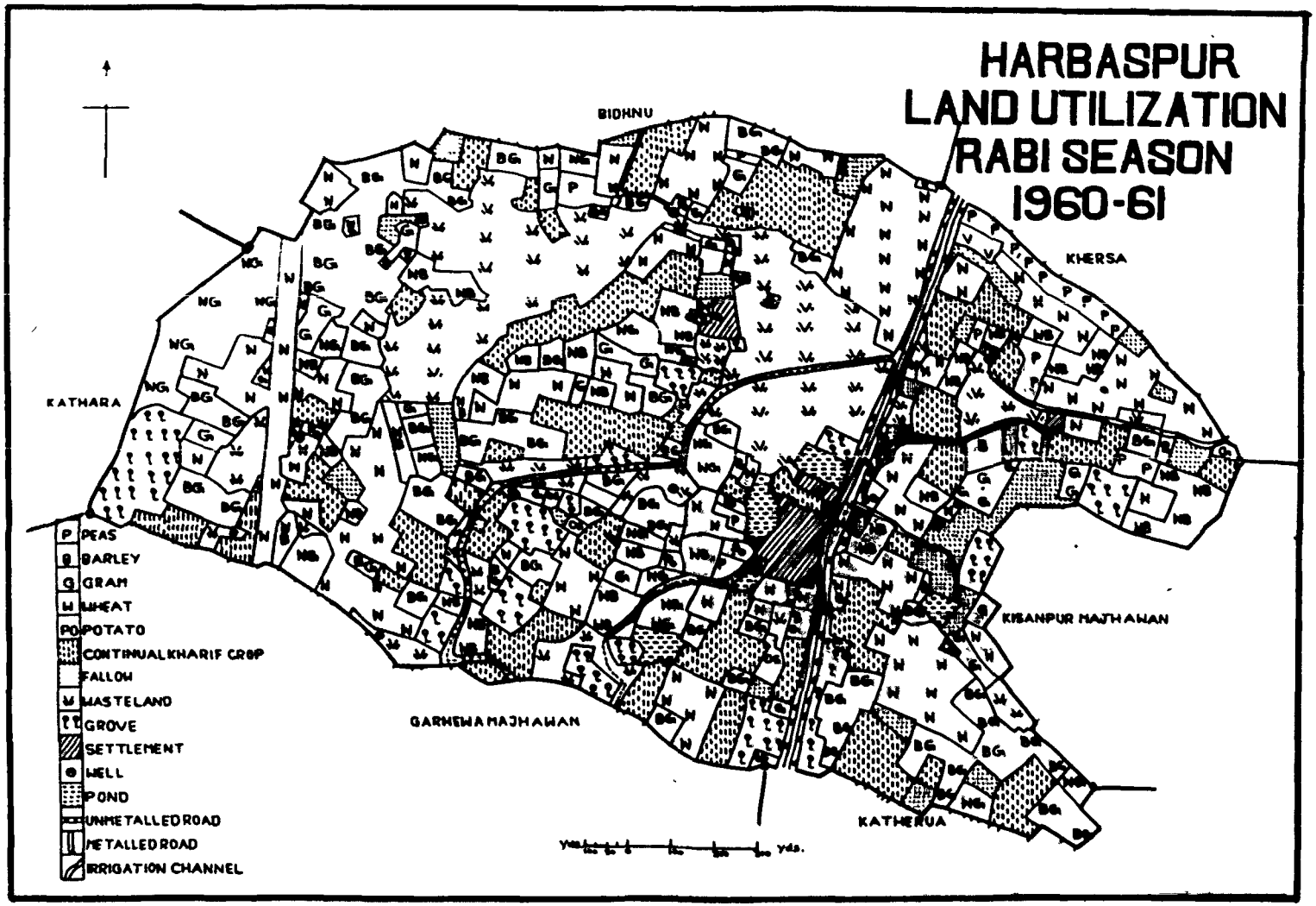
HARBASPUR
LAND UTILIZATION
RABI SEASON
1960-61
BIDHNU
KHERSA
KATHARA
KISANPUR MAJHAWAN
GARHEWA MAJHAWAN
KATHERUA
P PEAS
B BARLEY
G GRAM
W WHEAT
PO POTATO
CONTINUAL KHARIF CROP
FALLOW
WASTELAND
GROVE
SETTLEMENT
WELL
POND
UNMETALLED ROAD
METALLED ROAD
IRRIGATION CHANNEL
yds.

Fig. 38

Table XVI

Gross cultivated land --- 327.88 acres
Net cropped land in the rabi season 227.56 acres

Crops	Acrage under different crops	Percentage of the gross cultivated land	Percentage of the net cropped land	Total percentage of the gross cultivated land	Total percentage of the net cropped land
GRAIN CROPS:				68.08	98.08
Wheat	91.50	27.91	40.21		
Barley and Gram	57.17	17.44	25.12		
Barley and Wheat	27.86	8.50	12.24		
Gram and wheat	24.45	7.46	10.75		
Gram	11.64	3.55	5.12		
Peas	8.86	2.70	3.89		
Barley	1.70	0.52	0.75		
OTHER CROPS:-				1.33	1.92
Oil seeds	2.58	0.79	1.13		
Potatoes	1.80	0.54	0.79		
Continual kharif crops	73.17	22.31	...	22.31	
Fallow	27.15	8.28	...	8.28	
Total	327.88	100.00	100.00	100.00	100.00

Fig. 38 shows that in some fields two or more crops differing in their water requirements are sown in the rabi season . With the help of the mixture of gram and wheat or gram and barley, the cultivator unconsciously maintains the supply of nitrogen in a convenient way on very small holdings. Gram not only encourages

bacterial action in the soil, but builds up soil fertility also and adds to the food reserves of the villagers. Besides grain crops, oil seeds and Potatoes are also grown, but they together cover only about 2 per cent of the net cropped area. The area under potatoes can be increassed to an appreciable extent at least on the good quality lands with adequate manuring.

Double cropped land

The total of the land cropped twice in the year was 71.51 acres or 21.81 per cent of the gross cultivated land. A comparison of Figs. 39 and 34 reveals that double cropped area is mainly confined to the good quality land. Whereas rice is grown in every kharif with the supply of manures, it is usual to grow gram or gram and barley or peas in the rabi in the same field. The acreage under double cropping is less due to medium quality lands, which, either are devoted to millets and pulses or left fallow during the kharif season. Double cropping can be extended on the medium quality lands by cultivating early maturing leguminous crops in the kharif season.

Land use and Population

Table XVII shows the totals of various classes of lands as well as the per capita share of the villagers in these lands.

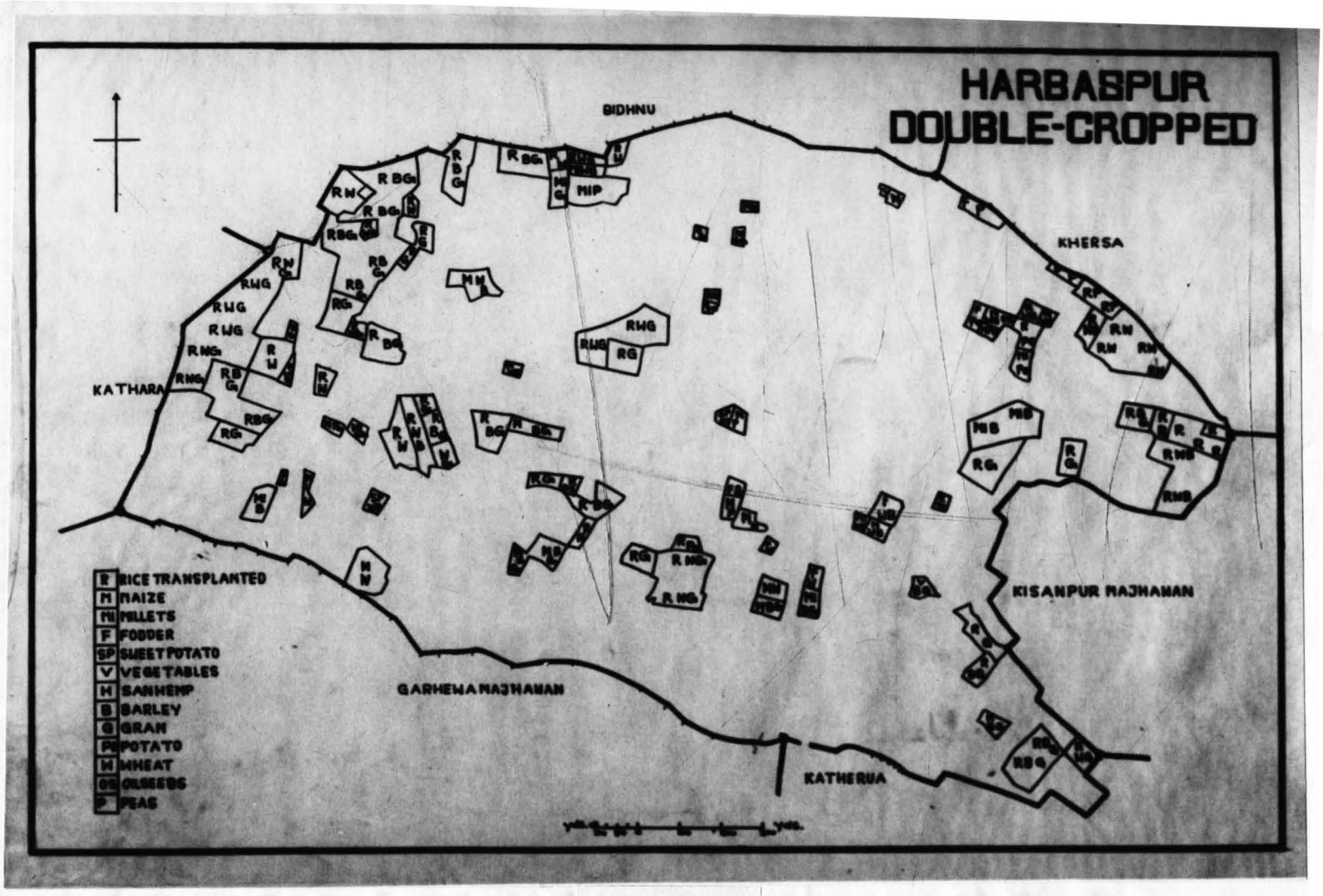
HARBASPUR
DOUBLE-CROPPED
BIDHNU
KHERSA
KATHARA
KISANPUR MAJHAWAN
GARHEWA MAJHAWAN
KATHERUA
R RICE TRANSPLANTED
M MAIZE
MI MILLETS
F FODDER
SP SWEET POTATO
V VEGETABLES
H SANHEMP
B BARLEY
G GRAM
P POTATO
W WHEAT
OS OILSEEDS
PE PEAS

Fig. 39

Table XVII

Total population of Harbaspur depending upon the produce of the village -- 522

	Total area of the village	Total available land for cultivation	Net cropped land in the kharif season	Net cropped land in the rabi season	Total cultivated land both of kharif and rabi	Double cropped land
Area (in acres)	448.52	327.88	171.83	227.56	399.39	71.51
Land per head of population	0.86	0.63	0.33	0.44	0.77	0.14

It will be further seen from Table XVII that the per head share of cultivated land in this village comes up to 0.63 acre only, but in the kharif season the per capita cultivated land is reduced to 0.33 acre due to the practice of fallowing. The per capita cultivated land in the rabi is 0.44 acre, which is less than the average per capita cultivated land. This is because the proportion of land occupied by continual kharif crops is large.

Table XVII further shows that the per capita share in the gross cultivated land (which includes the totals of kharif and rabi seasons) is 0.77 acre. It means that the amount of cultivated land in Harbaspur, supporting one person is 0.77 acre.

About seventy per cent[1] of the total population is exclusively dependent on land, which belongs to the primary rural class, while 30 per cent falls under the category of secondary rural population, which depends upon the primary rural population.

The village is self sufficient in its produce. The general health of a person and the standard of living, as observed by the writer is above the average. The scope for the extension of cultivated lands in this village, as revealed by the survey of the village, lies mainly in the reclamation of the existing waste land. In this way, the productive capacity of the village may be increased.

Table XVIII shows the Potential Production Units (P.P.U.) of the village.

Table XVIII

Average yield per acre of good farm land -- 900 lb. = 1 P.P.U.

Types of land	Area in acres	Average yield Inlb per acre	Productivity rating per acre	Number of P.P.U.
Good quality land (A)	77.43	1740	1.93	149.44
Medium quality land (B)	250.45	900	1	250.45
Poor quality land (C)	69.80	..	..	..
Total	397.68			399.89

(1) Data based upon the personal survey by the writer.

It will be seen from Table XVIII that the entire cultivable land of 398 acres in the village has a total productive capacity of 400 P.P.U. If 69.80 acres of the poor quality land may be reclaimed and converted into the medium quality land, the productive capacity of 70 P.P.U. can further be increased.

XXXXXXXXXX
XXXXXXXX

LAND UTILIZATION IN KHAJURI

Location

The village of Khajuri is situated on the left bank of the river Sengar in $26^{0}26'$N latitude and $79^{0}45'$E longtitude, at aa distance of about 4 miles north-west of the headquarters of tahsil Derapur and 39 miles west from the headquarters of the district Kanpur. The village is bounded by the villages of Guriapur in the north, Fatehpur Derapur in the east, Sanihapur in the south, and Khalla in the west. Its southern boundary is formed by the river Sengar. Two seasonal channels also form the boundary of the south-west and south-east partsof the village.

The river Sengar runs on south-easterly direction and physically forms the dominating features of the area, in which village is situated. Along the river is to be found a narrow allunial fringe of recent deposit known as Sengar tarai.[1]

(1) Lowland also known as kachhar.

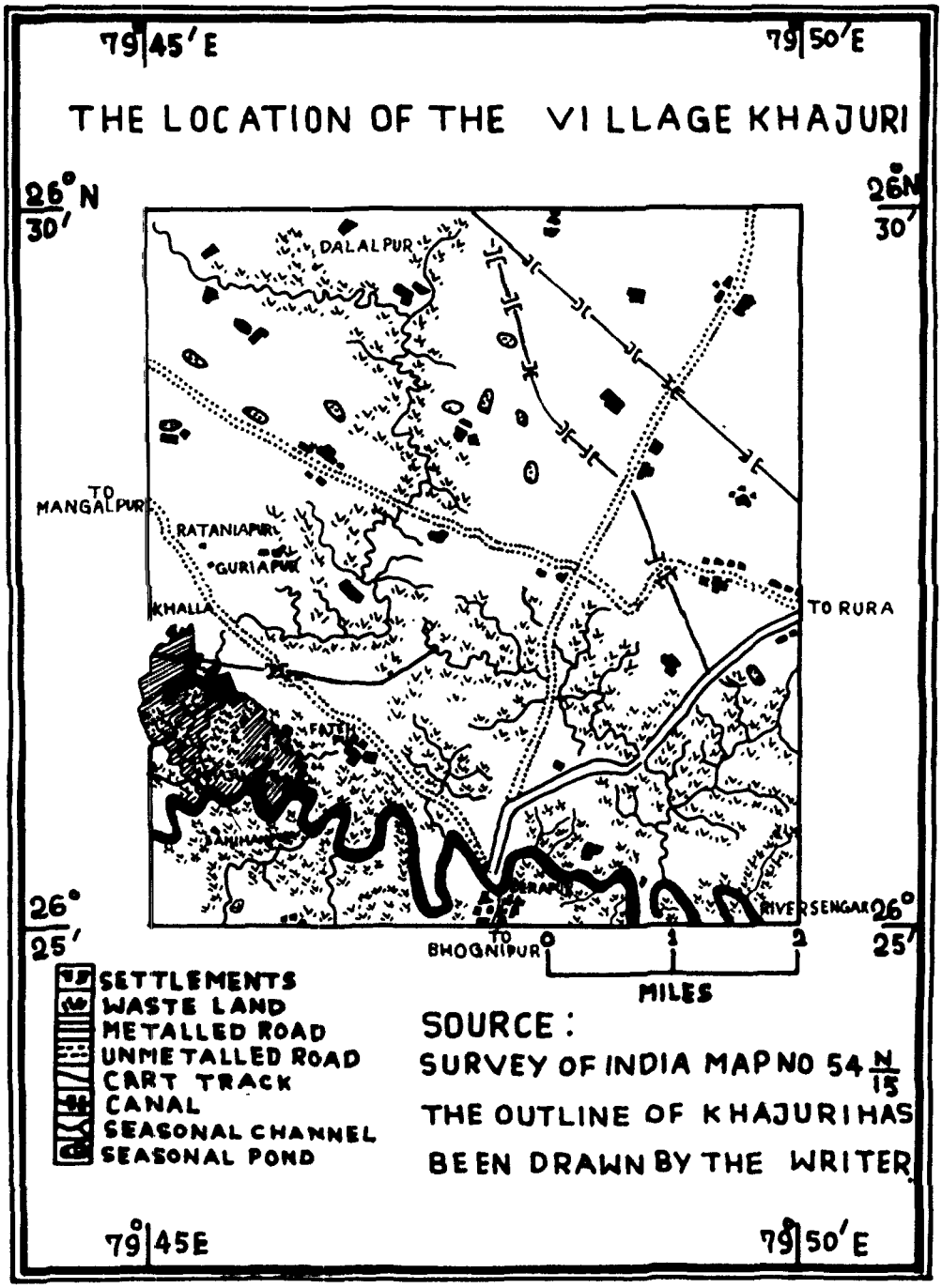
79°45'E
79°50'E
THE LOCATION OF THE VILLAGE KHAJURI
26°30' N
26°30'
DALALPUR
TO MANGALPUR
RATANIAPUR
GURIAPUR
KHALA
TO RURA
FATEH
ANIMA
BHOGNIPUR
RIVER SENGAR
26°25'
26°25'
0 1 2
MILES
SETTLEMENTS
WASTE LAND
METALLED ROAD
UNMETALLED ROAD
CART TRACK
CANAL
SEASONAL CHANNEL
SEASONAL POND
SOURCE :
SURVEY OF INDIA MAP NO 54 N/15
THE OUTLINE OF KHAJURI HAS BEEN DRAWN BY THE WRITER
79°45E
79°50'E

Fig. 40

which consists of yellow sandy loam. The narrow belt is liable to inundation from the river Sengar every year. The main settlement of the village lies in this narrow strip.

A series of rugged ravines extends above this tarai. Ravines comprise the central southern part of the village and they stretch inland for a distance of about a mile upward. The area of the ravines is highly broken, undulating and desolate being usually devoid of vegetation or else covered with a poor growth of worthless scrub.[1] Two seasonal channels, one from the south-western and the other from the south eastern extremity of the village, run in south easterly direction and join the river sengar. These channels have been formed as a result of gully erosion. They provide outlets for the surplus water which finds its way to the Senger during the wet monsoon months. The ravines are interspersed with undulating culturable soil of the yellowish sandy type known as Kasra or pilia and these patches are utilized for cultivation.

Above the ravines of the Sengar is a level expanse of yellow-loam, which occupies the northern part of the village. This northern part of the village is high lying, well-drained and also free from waterlogging.

---

(1) Kushi, dabb, ratna, kans and jarr grasses characterise the area of the ravines along the high banks of the river Sengar.

Khajuri is characterised by lack of means of communications. The rugged topography of the area, the extensive ravines and inundating seasonal channels make communications extremely difficult. There is a carttrack (Fig. 40) which runs through the heart of the village and joins the unmetalled road in the north. The road leads to the headquarters of tahsil Derapur about 4 miles towards the east and to Mangalpur about 6 miles towards the west. Another carttrack connects the village with the market of Nomari, 4 miles towards the north.

Climate

No climatic data are recorded in the village. The nearest rainfall recording station is Derapur, about 4 miles to the south east of the village. The data of rain fall recorded at the tahsil headquarters of Derapur have already been given in Tables III and IV.

Land classification

An attempt has been made to classify the village fields in Fig. 41 on the basis of fertility and productivity (see page 57) The soil of the good quality lands(A) is loamy mainly confined to the north of the hamlet of khajuri.[1] These fields are capable of producing two crops a year or devoted to sugarcane. The

(1) Besides the main settlement of the village Khajuri, another settlement known as khajuri ke purwa (hamlet) lies to the north of the village.

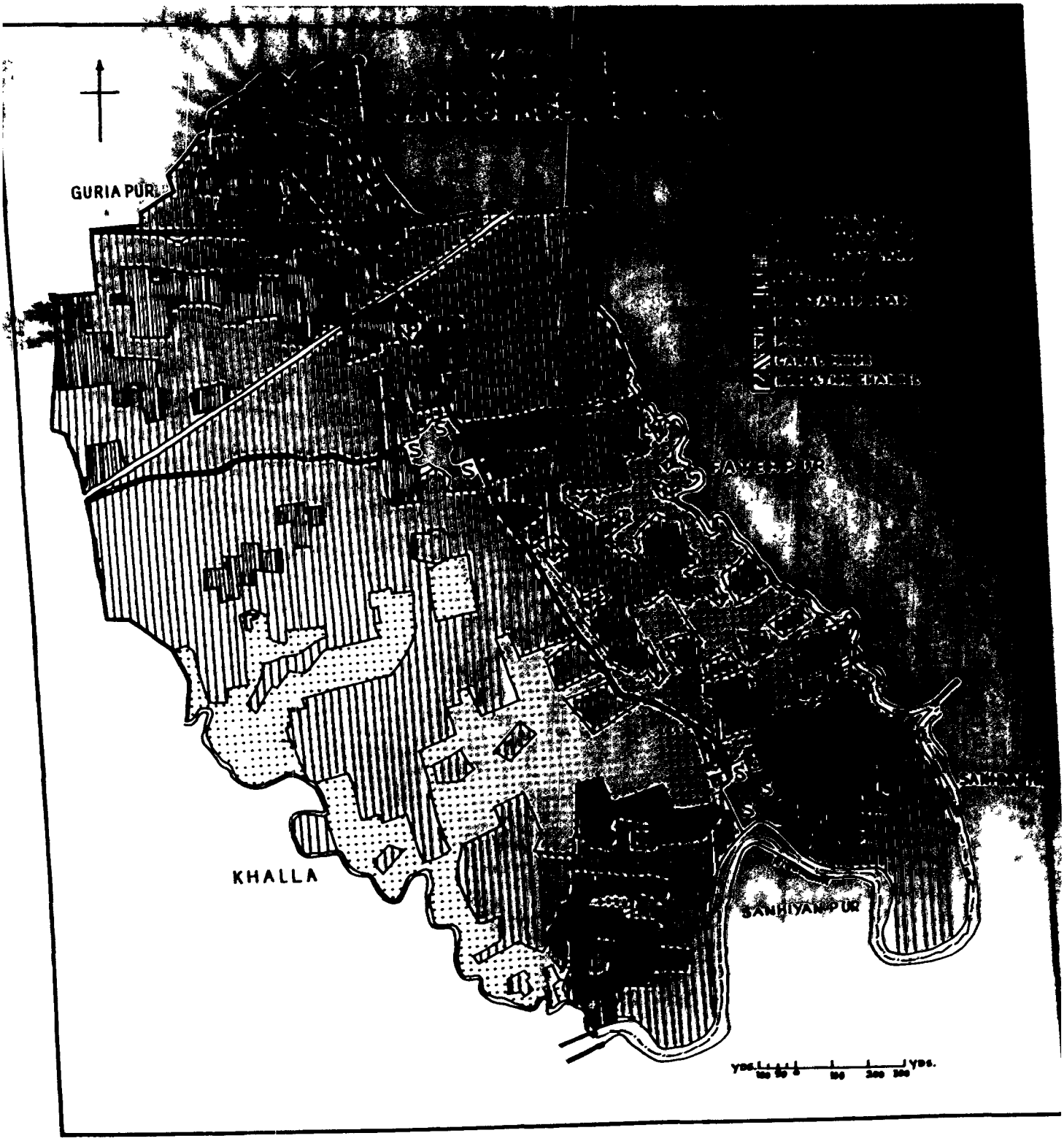

Fig. 41

soil of medium quality lands (B) is yellow sandy loam[1] and is generally confined to the vicinity of the river in the narrow strips of tarai. A few patches of the medium quality lands also exist in the ravines in the middle of the village, of which the soil is light sandy loam containing gravels. The soil of B Lands is less productive than A. B lands are devoted to either bigmillets or bulrush millets mixed with pulses. The intermediate land of the village belongs to the poor quality land (C), which is marked with the presence of extensive ravines and is unutilized.

Irrigation

Irrigation in the village is carried on mainly from the Mangalpur distributary of the lower Ganges canal. The area irrigated in kharif and rabi seasons of 1960-61 is shown in Fig. 42. It will be seen from Table III on page 65 that the total rain fall in the kharif season was 41.47 inches which was fairly higher than the average and was spread over sufficient number of days in the months of July and August. This amount of rainfall was adequate for the Kharif crops, with the result that none of the kharif crops, except broad cast rice and sugarcane, was irrigated. Broadcast rice is usually sown in the month of May and needs irrigation once or twice before the commencement of the summer rainfall. Table IV indicates, that as in the months of November and December

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(1) The yellow sandy loam is locally known as 'kaswa or 'pilia' in the village.

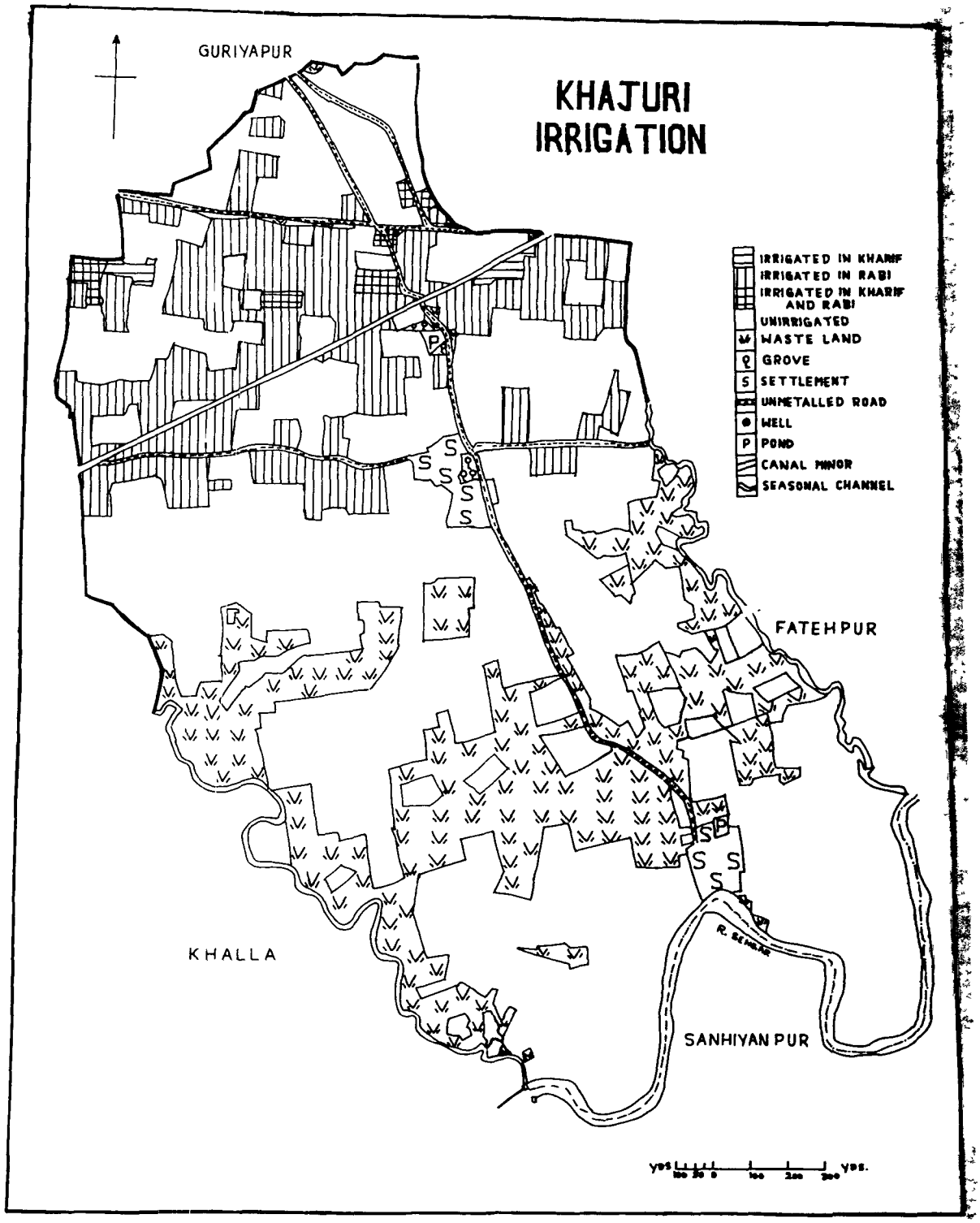
KHAJURI
IRRIGATION
GURIYAPUR
FATEHPUR
KHALLA
SANHIYAN PUR
IRRIGATED IN KHARIF
IRRIGATED IN RABI
IRRIGATED IN KHARIF AND RABI
UNIRRIGATED
WASTE LAND
GROVE
SETTLEMENT
UNMETALLED ROAD
WELL
POND
CANAL MINOR
SEASONAL CHANNEL

Fig. 42

there were no rain; all the rabi crops except gram required irrigation some times in the last week of December. As in the month of January and February the amount of the rain fall was adequate, rabi crop needed no irrigation in February. It will be seen from Fig. 42 that irrigated area is only confined to the north of the hamlet of khajuri. The area lying towards the south of the hamlet is entirely dependent upon rainfall, as the level of the undulating ground of ravines prevents the canal water from being brought. The sub-soil water is over 60 feet deep and irrigation by wells is impracticable. Even the lifting of drinking water is a laborious process. Therefore such crops as millets mixed with pulses, big or small millets in the kharif and either gram or gram mixed with barley in the rabi are cultivated in this area.

Land utilization

The land use of the village in 1960-61 has been represented in Fig. 43 based upon the writer's field work in the village.[1]

The following Table gives a summary of the proportion of the village lands devoted to various uses in 1960-61.

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(1) The base map showing the fields and their areas was obtained from the lekhpal of the village concerned. The village was visited by the writer in the kharif season of 1960 and the rabi season of 1961, and the use of which each field was being put was recorded on the base map. From these data Figs. 43-46 were prepared.

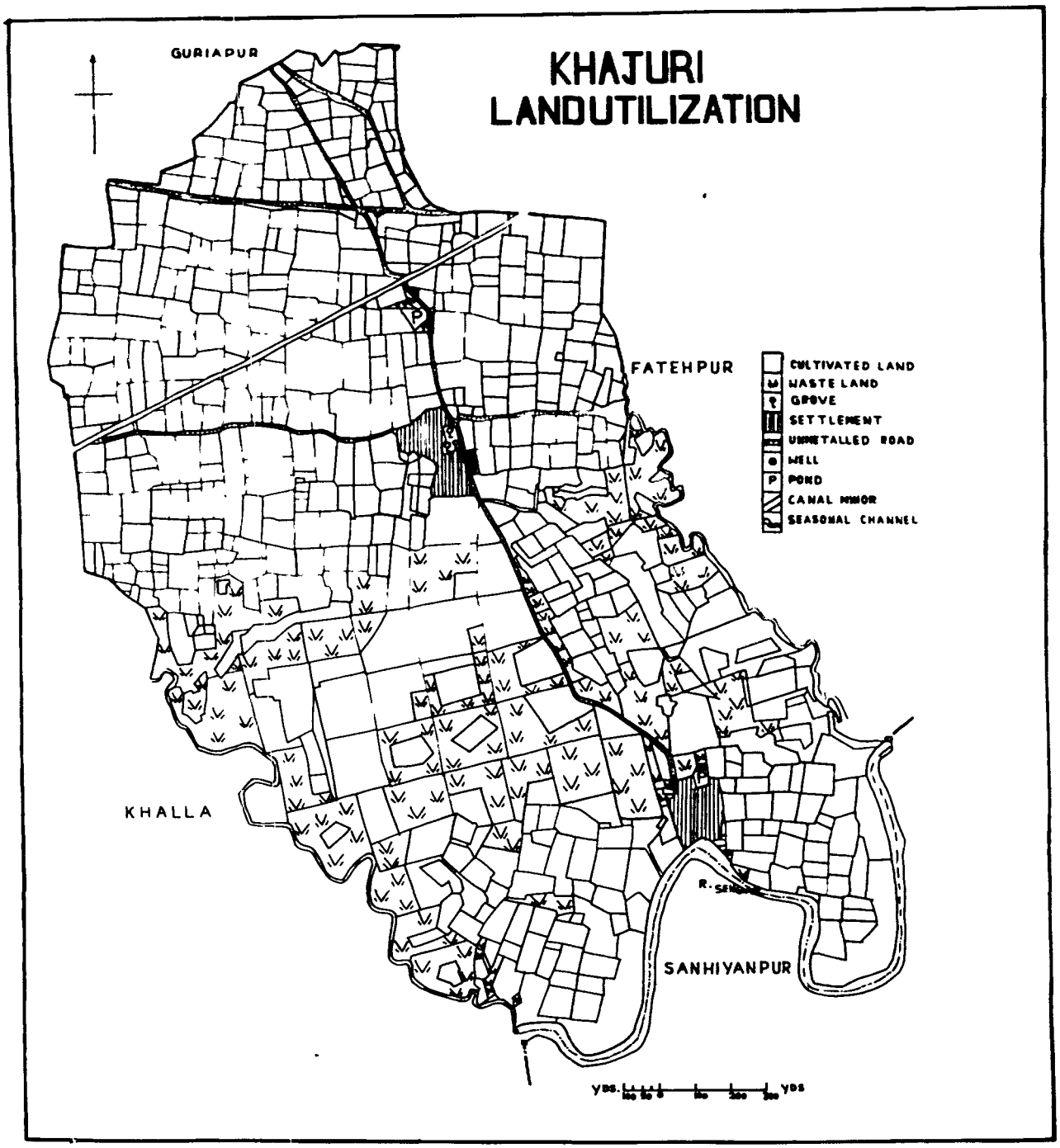
KHAJURI
LANDUTILIZATION
GURIAPUR
FATEHPUR
KHALLA
SANHIYANPUR
CULTIVATED LAND
WASTE LAND
GROVE
SETTLEMENT
UNMETALLED ROAD
WELL
POND
CANAL MINOR
SEASONAL CHANNEL
YDS.
YDS

Fig. 43

Table X IX

Total area of the village --- 616.89 acres

Use of land	Area in acres	Percentage of the total area
Cultivated land	517.49	83.87
Wasteland[1]	70.27	11.40
Grove	1.11	0.18
Settlements	7.70	1.25
Road	7.70	1.25
Seasonal channels	8.51	1.39
Ponds	0.59	0.09
Irrigation Channel	3.52	0.57
Total	616.89	100.00

It is clear from the above Table that 84 per cent of the total land of the village is cultivated, 5 per cent of the total land is not available for cultivation, while 11 per cent is unproductive of which 9.5 per cent may be classed as ravinic land.

It will be seen from the Table XX that one third of the total number of plots are below .50 acre in size;

(1) Out of the total wasteland acreage of 70.27, the ravine-land was 58.73 acres.

while the plots varying between .50 and 1 acre have another 37 per cent of the total number of plots. A little less than one-fifth of the total number of plots are between 1 to 20 acres in size. The percentage of the plots over 3 acres is very low. These plots are confined to the ravine lands of the village and are irregular in shape.

Table XX

Size of plots	Number of plots of each size	Percentages of the plots of each size to the total No.of plots
Below .50 acre	212	33.9
.50 acre to 1.9acre	232	37.1
1.9 acre to 2.0acres	117	18.7
2.0 acre to 3.0acres	16	2.6
over 3.0acres	48	7.7
Total	625	100.0

The soil plays an important rôle upon the size of the fields. A comparison of Figs. 41 and 43 shows that the fields of the good quality lands are smaller in size than that of the fields of the medium and poor quality lands.

Land utilization in the kharif season

The use of land in the kharif season of 1960 is mapped in Fig. 44. The area occupied by each crop is shownin the Table XXI.

Table XXI

Gross cultivated area --- 517.49 acres

Net cropped area --- 279.69 acres

6

Crops	Area in acres	Percentage of gross cultivated land	Percentage of net cropped land	Total percentage of gross cultivated land	Total percentage of net cropped land
GRAIN CROPS:-				51.89	96.01
Millets mixed with pulses	153.39	29.64	54.84		
Small millets (Bulrush & Kakun)	70.84	13.68	25.33		
Maize	39.10	7.55	13.98		
Rice (Broad cast)	5.19	1.02	1.86		
OTHER CROPS:-				2.16	3.99
Fodder	9.69	1.87	3.46		
Sugarcane	0.83	0.16	0.30		
Sweet Potato	0.39	0.08	0.14		
San hemp	0.26	0.05	0.09		
Fallow	237.80	45.95	..	45.95	..
Total	517.49	100.00	100.00	100.00	100.00

The above table shows that area under gram crop is 96 per cent of the net cropped land in the kharif season. Millets mixed with pulses and small millets are the major crops occupying more than half and one-fourth of the net cropped land respectively. Maize is the next important crop, which covers another

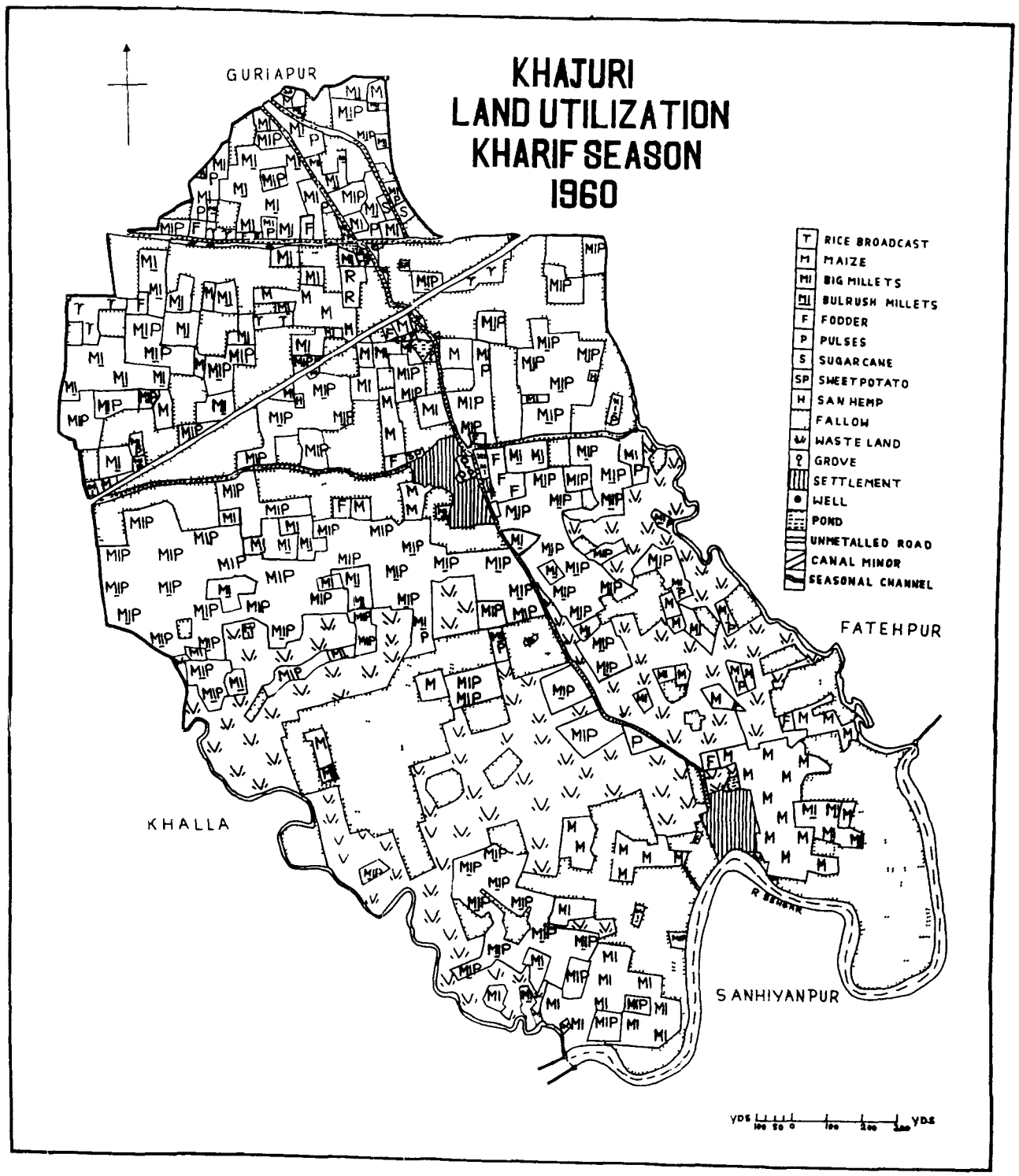
KHAJURI
LAND UTILIZATION
KHARIF SEASON
1960
GURIAPUR
FATEHPUR
KHALLA
SANHIYANPUR
T RICE BROADCAST
M MAIZE
MI BIG MILLETS
MI BULRUSH MILLETS
F FODDER
P PULSES
S SUGARCANE
SP SWEETPOTATO
H SAN HEMP
FALLOW
W WASTE LAND
G GROVE
SETTLEMENT
WELL
POND
UNMETALLED ROAD
CANAL MINOR
SEASONAL CHANNEL
YDS
YDS

Fig. 44

14 per cent of the net cropped area.

A comparison of Figs. 41 and 44 shows a close influence of soil on the crop pattern. Maize, broad cast rice, sugarcane and fodder crops occupy mostly the good quality land. Bulrush millets and millets mixed with pulses find a place in the sloping fields among the area of the ravines, where patches of light sandy loam soils are to be found.

Table XXI further shows that 45.95 per cent of the gross cultivated area is left fallow in the kharif season. A large proportion of these fallow lands confined to the raviny area may be devoted to sawan as it grows well on light sandy soil, and the only attention it requires is careful weeding. It ripens within a short period of 6 weeks after its sowing and the early maturity of the crop provides the cultivator and his family with food at a time when the reserves of the rabi grains are running low. In this way, cultivated area may be increased by reclaiming ravine lands by introducing sawan and bulrush millets.

Land utilization in the Rabi season

The use of land in the rabi season of 1960-61 is illustrated in Fig. 45 and Table below shows the area occupied by each crop in this season.

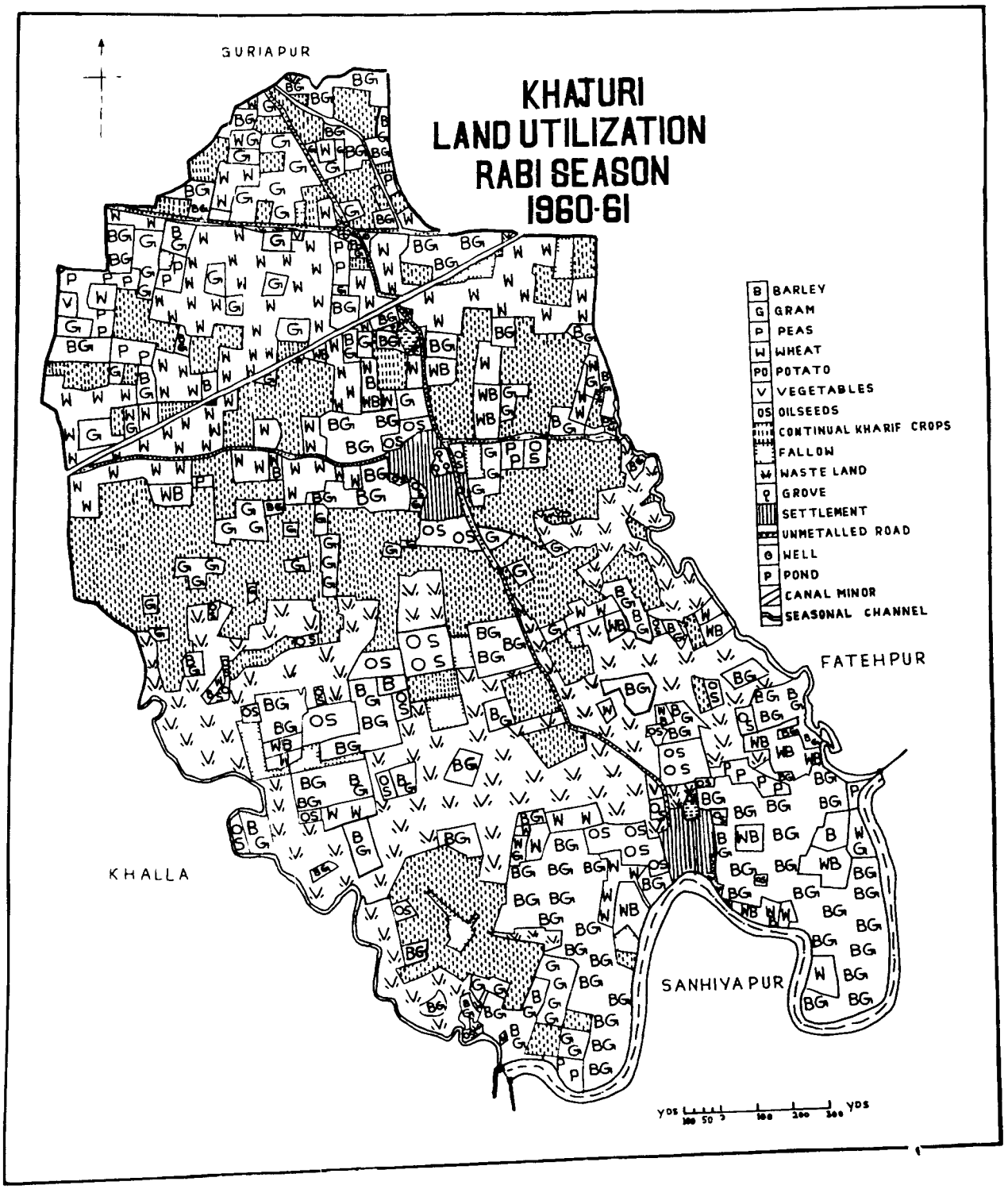
KHATURI
LAND UTILIZATION
RABI SEASON
1960-61
GURIAPUR
FATEHPUR
KHALLA
SANHIYA PUR
B BARLEY
G GRAM
P PEAS
W WHEAT
PO POTATO
V VEGETABLES
OS OILSEEDS
CONTINUAL KHARIF CROPS
FALLOW
WASTE LAND
GROVE
SETTLEMENT
UNMETALLED ROAD
WELL
POND
CANAL MINOR
SEASONAL CHANNEL
YDS
YDS

Fig. 45

Table XXII

Gross cultivated land --- 517.49 acres
Net cropped land in the rabi season --- 314.80 acres

Crops	Area in acres	Percentage of gross cultivated land	Percentage of net cropped land	Total percentage of gross cultivated land	Total percentage of net cropped land
GRAIN CROPS:-				56.14	92.29
Barley and Gram	132.49	25.60	42.09		
Wheat	82.82	16.00	26.31		
Gram	37.26	7.20	11.83		
Wheat & Barley	21.59	4.17	6.86		
Peas	11.49	2.22	3.65		
Wheat & Gram	3.08	0.60	0.98		
Barley	1.80	0.35	0.57		
OTHER CROPS:-				4.69	7.71
Oil seeds	23.59	4.56	7.49		
Potatoes	0.68	0.13	0.22		
Continual kharif crops	154.22	29.80	..	29.80	
Fallow	48.47	9.37	..	9.37	..
Total	517.49	100.00	100.00	100.00	100.00

It will be seen from above table that 92 per cent of the net cropped land in the rabi season is devoted to grain crops. Barley mixed with gram is the principal crop in this season covering 42 per cent of the net cropped land, while wheat occupies another 26 per cent. Mixed cropping, as it is clear from Table XXII

is practised on a large scale, especially in the south of the village as wheat and barley mixed with gram are produced without irrigation in the south.

Besides grain crops , lin seed occupies 7.49 per cent of the net cropped area. It is a cash crop for the villagers and is grown without irrigation facilities on the medium quality lands, where the soils is mainly light sandy loam. The oil is extracted from the seeds and sold in the neighbouring markets of Derapur and Nonari.[1] The oil cake forms good cattle food. The cash obtained from the linseed is utilized for purchasing articles of daily use.

Double cropped land

The total of the land cropped twice in the year was 77.00 acres or 14.88 per cent of the gross cultivated land. (Fig.46) The double cropped area is less due to the existance of medium quality lands, as they are deprived of irrigation facilities and supply of adequate manures. They, therefore, can not yield two crops a year in the north. But the practice of rotation is the usual feature in the south and middle of the village. The soil of this area is light sandy loam and less productive. These lands are devoted to millets and pulses in one year and in the next year, they are left fallow during the kharif while in the rabi season they are devoted

(1) On inquiry from the villagers, the writer came to know that instead of extracting the oil, it was sold in a great deal.

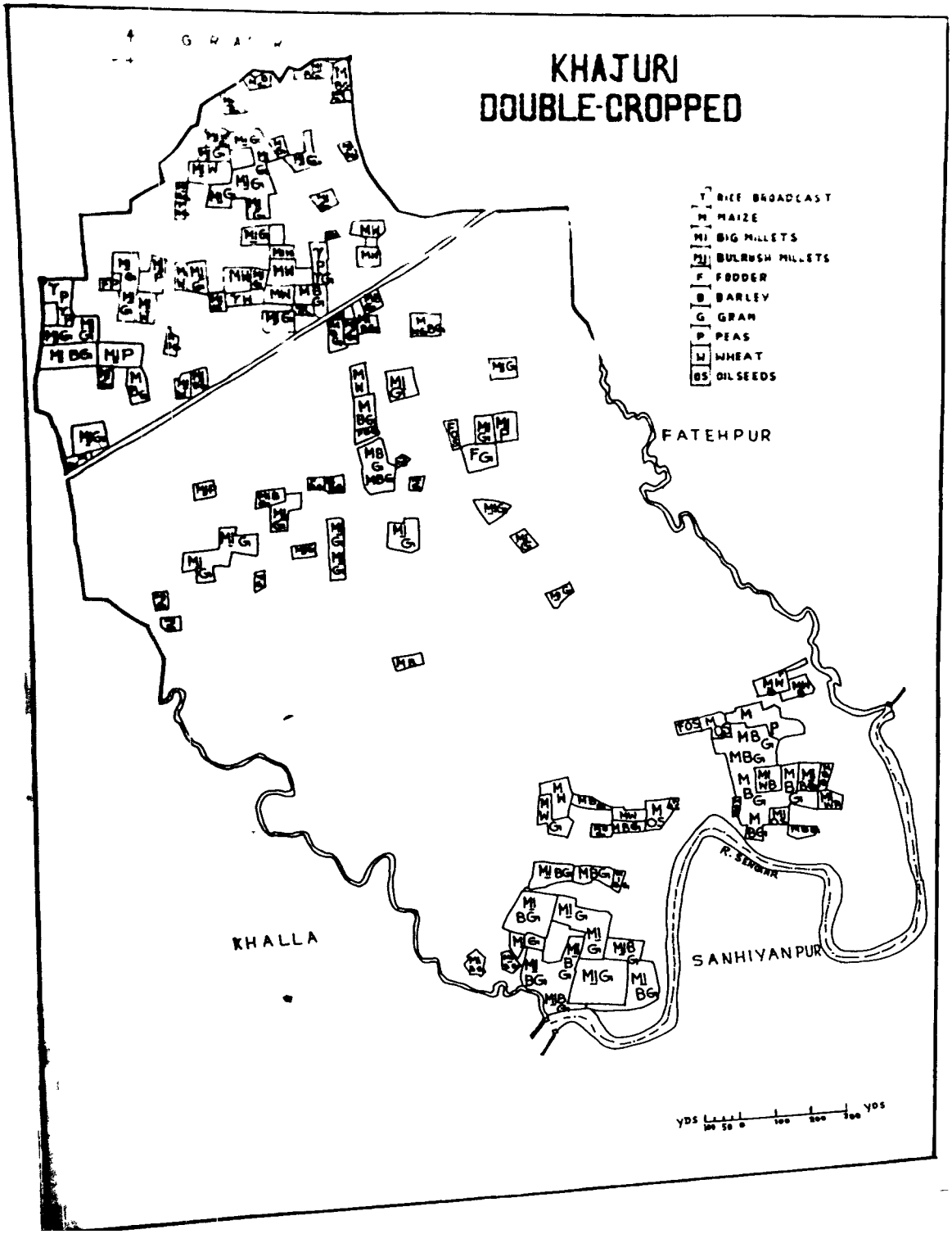
KHAJURI
DOUBLE-CROPPED
T RICE BROADCAST
M MAIZE
MI BIG MILLETS
MI BULRUSH MILLETS
F FODDER
B BARLEY
G GRAM
P PEAS
W WHEAT
OS OILSEEDS
FATEHPUR
KHALLA
SANHIYANPUR
R. SENGAR
YDS

Fig. 46

to the mixed crop of barley and gram.

Land use and Population

Table XXIII shows the totals for different categories of lands in the village and the percapita share of the villagers in them.

Table XXIII

Total population of khajuri, depending upon the produce of the village ---539

	Total area of the village	Total ava-ilable land for cultiva-tion	Net crop-ped land in the kharif season	Net cro-ppedland in the rabi season	Total cul-tivated land both of kharif and rabi	Double cropped land
Area in acres	616.89	517.49	279.69	314.80	594.49	77.0
Land per head of population	1.14	0.96	0.52	0.58	1.10	0.14

It will be seen from the above table that the per head share of the cultivated land is 0.96 acre, which is reduced to 0.52 and 0.58 acres in the kharif and rabi seasons respectively. This is bdue to the large proportions of land left fallow during the kharif season and continual kharif crops in the rabi season.

Table XXIII further shows that the amount of cultivated land supporting one person is 1.10 acres which is comparatively larger than that of the villages of Daheli and Harbaspur.

As far as the occupations of the villagers are concerned it is remarkable that the pressure of population on land is very great as 512 persons or 95 per cent of the total population are exclusively dependent upon land while 5 per cent belongs to the secondary rural population, who are indirectly dependent upon the land serving the primary rural population. The standard of living and health of the people in the village is high.

Table XXIV shows the potential productive capacity of the village:

Table XXIV

Average yield per acre of good farm land= 740 lb.= 1 P.P.U.

Types of land	Area in acres	Average yield in LB. per acre	Productivity rating per acre	Number of P.P.U.
Good quality land (A)	77.83	1580	2.1	163.44
Medium quality land (B)	439.66	740	1.0	439.66
Poor quality land (C)	70.27	--	..	...
Total	587.76			603.10

It will be seen from Table XXIV that 608 P.P.U. are obtained from the total culturable land of the village. But at present the poor quality land gives not a single P.P.U. The scope for the addition of P.P.U. lies mainly in the utilization of poor quality lands. Ravines are the existing unutilized lands of the village, which may be reclaimed and the productive capacity of the village can further be increased.

LAND UTILIZATION IN PITAKPUR

Location

The village of Pitakpur lies in the south-west of the tahsil Bhognipur of the district Kanpur. The village comprises an area of 392 acres and is situated in $26^{0}17'N$ latitude and $79^{0}49'E$ longitude. It is surrounded by the villages of Rajpur in the north, Bhal in the east, Damanpur in the south and Humayunpur in the west. The Yamuna Sengar tract, in which the village lies, is undulating plain with a gentle slope towards the south-east close to the southern vicinity of the village, is found the tarai area of the Sonao, which represents an old channel of the river Yamuna (Fig. 47). The Sanao on its village side has now been much silted up and is being utilized for cultivation.

Pitakpur has an easy access to the local market towns. There is a carttrack, which runs through the west of the village and joins the old Mughal Road[1] at Rajpur lying at a

(1) The Mughal road runs from Allahabad to Agra through Ghatampur Musanagar, Bhognipur and Sikandra in the Kanpur district.

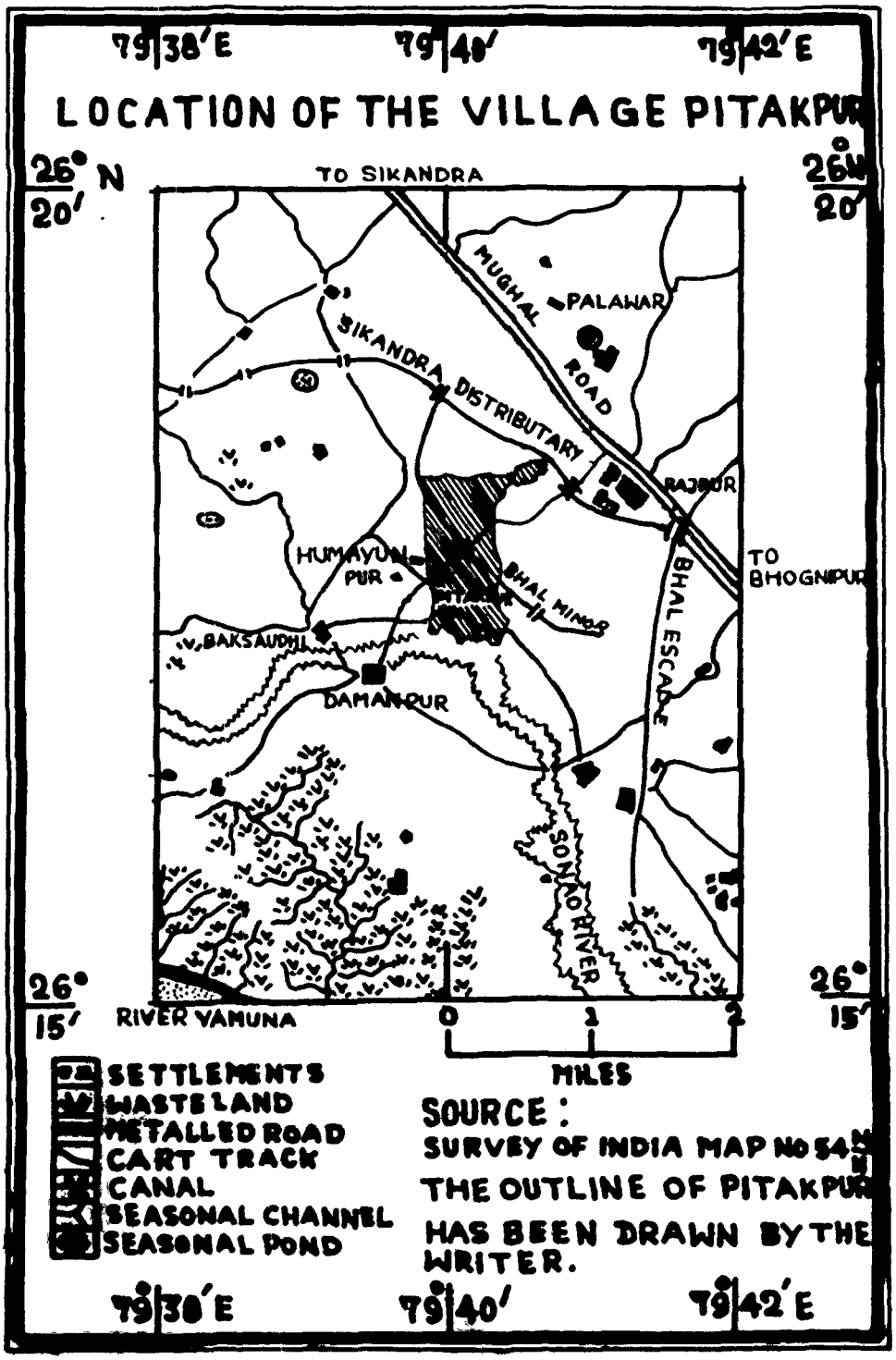
79°38'E
79°40'
79°42'E
LOCATION OF THE VILLAGE PITAKPUR
26° 20' N
26° 20'
TO SIKANDRA
MUGHAL ROAD
PALAWAR
SIKANDRA DISTRIBUTARY
RAJBUR
HUMAYUN PUR
BHAL MINOR
BHAL ESCADE
TO BHOGNIPUR
V. BAKSAUDHI
DAMANPUR
SONAO RIVER
26° 15'
RIVER YAMUNA
0 1 2
MILES
SETTLEMENTS
WASTE LAND
METALLED ROAD
CART TRACK
CANAL
SEASONAL CHANNEL
SEASONAL POND
SOURCE:
SURVEY OF INDIA MAP NO 54
THE OUTLINE OF PITAKPUR
HAS BEEN DRAWN BY THE WRITER.
79°38'E
79°40'
79°42'E

Fig. 47

distance of 2 miles to the north of Pitakpur. From Rajpur regular bus service is available for Sikandra and Pukhrayan. The former is about 6 miles towards the north-west of the village, while the latter is 14 miles in the north-east of the village.

Climate

No climatic data are recorded in the village. The data of rainfall recorded at Pukhrayan, 14 miles from Pitakpur have, therefore, been given in Tables XXV and XXVI and may be taken as close approximation for the village.[1]

Table XXV

Kharif season, 1960 (Pukhrayan)

	MONTHS					
	June	July	August	September	October	Total
Rain fall in inches in the kharif season, 1960.	2.25	11.54	15.02	5.05	11.06	44.92
Rainy days in kharif, 1960	4	16	21	6	5	52
Average rainfall in inches	3.15	8.96	11.42	6.43	1.15	38.11

(1) The data of rainfall for the kharif and rabi seasons of 1960-61 for Pukhrayan, the headquarters of tahsil Bhognipur were obtained from the district headquarters of Kanpur.

Table XXVI

Rabi Season, 1960-61 (Pukhrayan)

	MONTHS					
	November	December	January	February	March	Total
Rainfall in inches in the rabi-season, (1960-61)	...	...	2.53	0.55	...	3.08
Rainy days in rabi,(1960-61)	...	...	6	1	...	7
Average rainfall in inches	0.06	0.27	0.71	0.55	0.28	1.87

Land classification

The soil of the area in which the village lies varies mainly from loam to sandy loam with patches of kabar[1]. The village fields have been classified on the basis of fertility and productivity in Fig. 48. The soil of the good quality land(A) is loamy and yields two crops a year. The medium quality lands (B)consist

(1) Kabar is black clay and resembles the Black cotton soil in its appearance.

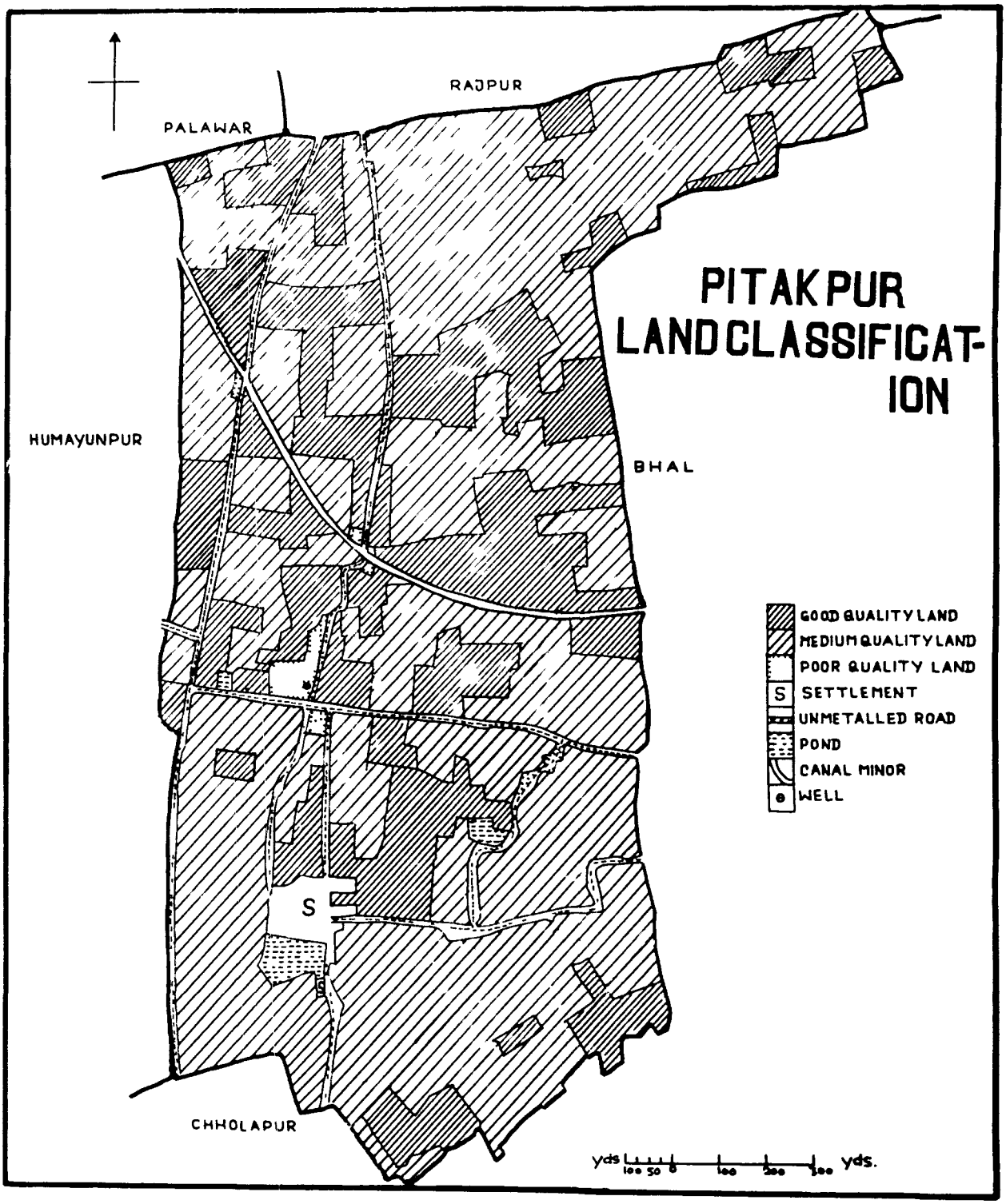
PITAKPUR
LAND CLASSIFICAT-
ION
RAJPUR
PALAWAR
HUMAYUNPUR
BHAL
CHHOLAPUR
S
GOOD QUALITY LAND
MEDIUM QUALITY LAND
POOR QUALITY LAND
SETTLEMENT
UNMETALLED ROAD
POND
CANAL MINOR
WELL
yds
100 50 0 100 200 300
yds.

Fig. 48

of light sandy loam and is less productive than A. The (B) lands are either left fallow in the kharif or are devoted to millets and pulses.

The poor quality lands (C) are unutilized due to the poverty of soil.

Irrigation

The chief source of the irrigation in the village is the branch of the Sikandra distributary of the Lower Ganga Canal. The area irrigated in the kharif and rabi seasons of 1960-61 is shown in Fig. 49. It will be seen from Table XXV that the total rainfll in the kharif season, 1960 was 44.92 inches, which was about 13 inches higher than the average rainfall. The rainfall was well distributed in the months of June, July, August, and September but the amount of rainfall for the month of October was 11.0 inches, which damaged the rabi crops, as the preparation of the fields for rabi was delayed. During the kharif season none of the crops except rice broadcast and cotton was irrigated.[1] Table XXVI shows that the months of November and December were entirely rainless. With this result a few crops such as wheat, peas, vegetables and potatoes were irrigated in the month of December. But the amount of rainfall in

(1) Sugarcane and cotton are sown before the commencement of the monsoon rains, their cultivation, therefore, can not be under taken with out irrigation as April and May are usually dry months.

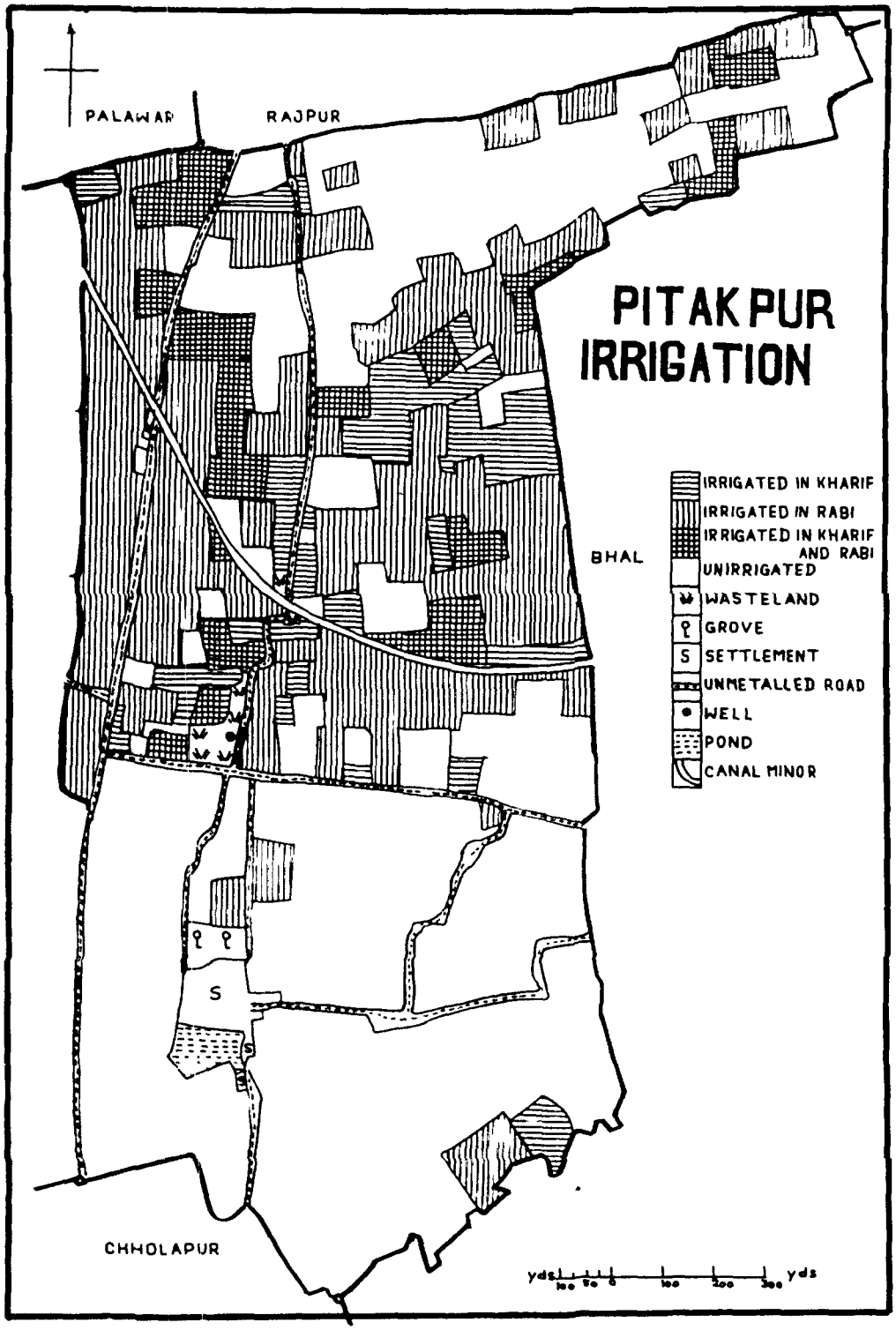
PALAWAR
RAJPUR
PITAKPUR
IRRIGATION
BHAL
IRRIGATED IN KHARIF
IRRIGATED IN RABI
IRRIGATED IN KHARIF AND RABI
UNIRRIGATED
WASTELAND
GROVE
SETTLEMENT
UNMETALLED ROAD
WELL
POND
CANAL MINOR
S
CHHOLAPUR
yds
yds

Fig. 49

the months of January and February was adequate therefore none of the rabi crops was irrigated in these two months. It will be seen from Fig. 49 that irrigated area is only confined to the north of the village. The area lying towards the south and south-east of the village is entirely dependent upon rainfall. In the tarai area of the Sonao, where irrigation is impracticable, coarse crops such as millets and pulses in the kharif and barley mixed with leguminous crops like gram in the rabi season were sown. In this area the facility of canal irrigation can not be provided, wells are also impracticable as water table lies between 60 and 80 feet.

Land Utilization

The land-use of the village in 1960-61 is shown in Figs. 50 to 53. The preparation of these maps is based on the writer's field work in the village.[1]

Table XXVII

Total area of the village--392.12 acres

Use of land	Area in acres	Percentage of the total land
Cultivated land	367.40	93.69
Wasteland	3.26	0.83
Groves	1.09	0.27
Settlement	4.73	1.21
Road	8.66	2.21
Pond	3.56	0.91
Irrigation Channels	3.42	0.88
Total	392.12	100.00

(1) The base map showing the fields and their areas was obtained from the Lekhpal of the village concerned. Like all the villages, it was also visited by the writer in the kharif season of 1960 and the rabi season of 1961, and the use to which each field was being put was recorded on the base map. From these data Figs. 50 to 53 were prepared.

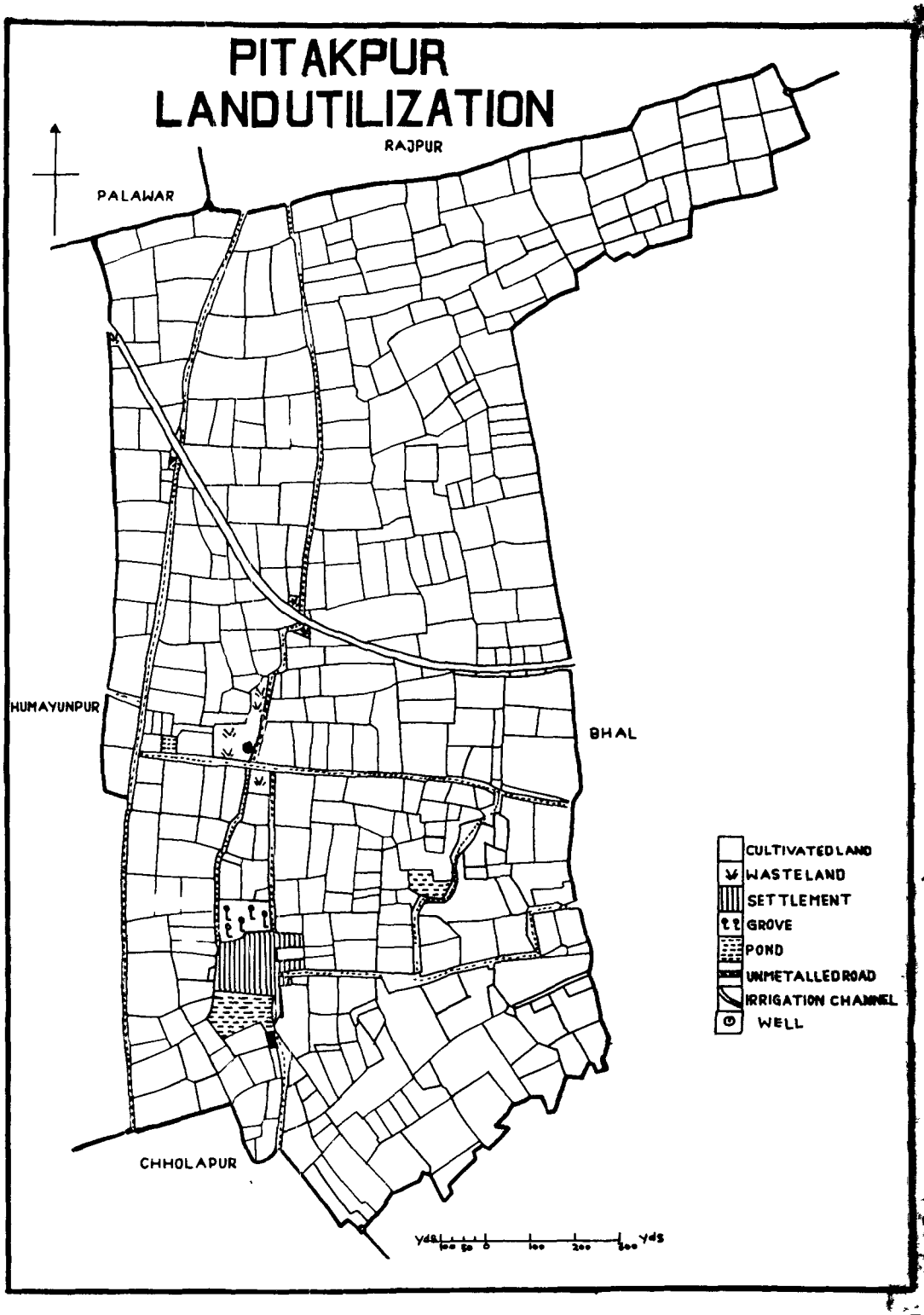
PITAKPUR
LANDUTILIZATION
RAJPUR
PALAWAR
HUMAYUNPUR
BHAL
CHHOLAPUR
CULTIVATED LAND
WASTE LAND
SETTLEMENT
GROVE
POND
UNMETALLED ROAD
IRRIGATION CHANNEL
WELL
Yds
Yds

Fig. 50

Table XXVII shows that the cultivated land constitutes 94 per cent of the total area of the village, a striking feature in the use of land. The proportion of land is non agricultural uses is about 5 per cent, while a little less than 1 per cent is wasteland and rendered unproductive. The most remarkable feature of the wasteland is the occurrence of the weed jali or jari[1] But this fact is not altogether disadvantageous, as its berries helped to eke out the food supply of the poorer classes. Occasionally, fields lying to the close, of wastelands are infested by this weed. A large number of labour is required to keep many of the infested fields to clear of it. It will be realised that further extension of cultivated land in this village is not possible as the wasteland occupies a very small share of the total area.

Area under groves is negligible and the groves consist mostly of non-food trees such as Pipal (Bo-tree), mahua(bassia lati-folia) and nim (Melia azadirachta).

The size of the plots varies from below 0.50 acre to more than 3 acres in the village. The size of the plots in 1960-61 was as fallows:-

Table XXVIII

Size of plots	Number of plots of each size	Percentage of the plots of each size to the total number of plots
Below 0.50 acre	130	30.1
0.50 acre to 1.0 acre	142	32.8
1.0 acre to 2.0 acres	129	29.9
2.0 acre to 3.0 acres	22	5.1
over 3.0 acres	9	2.1
Total	432	100.0

(1) The weed is locally known as the 'Jhar-Berry'.

It will be seen from Table XXVIII that the majority of plots (63 per cent) are below 1 acre of which 30 per cent were below 0.50 acre. Of the total number of plots about 30 per cent were between 1 to 2 acres and only 7 per cent above 2 acres.

Land Utilization in the Kharif Season

The use of land in the kharif season of 1960 is mapped in Fig. 51. The area occupied by each crop is shown in the following Table.

Table XXIX

Gross cultivated area 367.40 acres
Net cropped area in the kharif season 203.69 acres

Crops	Area in acres	Percentage of gross cultivated land	Percentage of net cropped land	Total percentage of gross cultivated land	Total percentage of net cropped land
GRAIN CROPS:-				46.23	33.48
Millets	78.40	21.34	38.49		
Bulrush millet	57.54	15.67	28.25		
Rice(Broadcast)	26.81	7.29	13.16		
Big millet	6.15	1.67	3.02		
Maize	1.14	0.31	0.56		
OTHER CROPS:				9.16	16.52
Cotton	11.11	3.02	5.95		
Fodder	21.26	5.79	10.44		
Vegetables	1.06	0.29	0.52		
San hemp	0.22	0.06	0.11		
Fallow	163.71	44.56	....	44.56	....
Total	367.40	100.00	100.00	100.00	100.00

It will be seen from the above table that food cereals occupy over eight-tenths of the net cultivated land in the

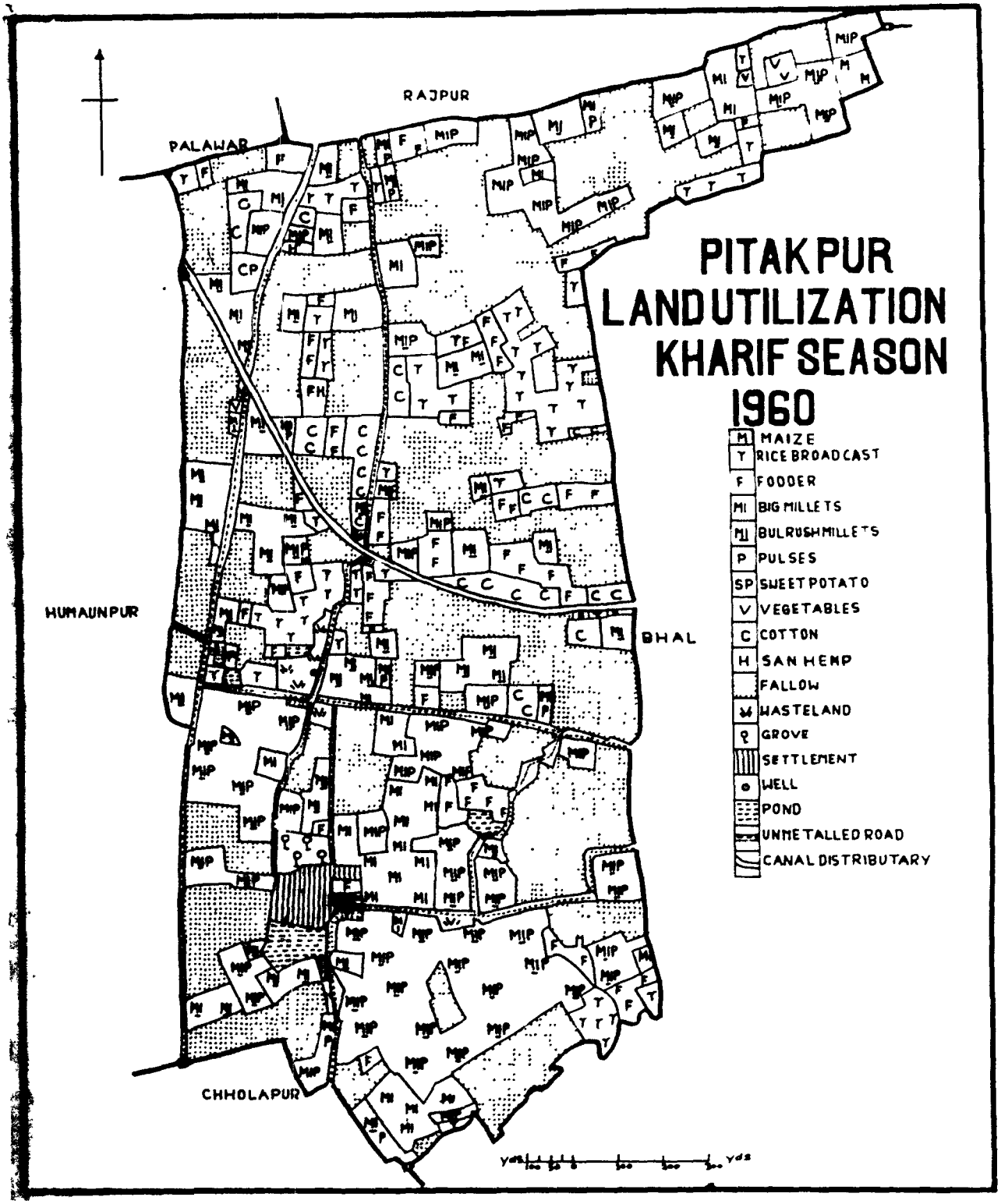
PITAKPUR
LAND UTILIZATION
KHARIF SEASON
1960
RAJPUR
PALAWAR
HUMAUNPUR
BHAL
CHHOLAPUR
M MAIZE
T RICE BROADCAST
F FODDER
MI BIG MILLETS
MJ BULRUSH MILLETS
P PULSES
SP SWEET POTATO
V VEGETABLES
C COTTON
H SAN HEMP
FALLOW
W WASTELAND
G GROVE
SETTLEMENT
WELL
POND
UNMETALLED ROAD
CANAL DISTRIBUTARY

Fig. 52

kharif season millet mixed with pulses is the major crop and occupies a little less than four-tenths of the net cropped area. Next important crop is bulrush millet, which covers another 28 per cent of the net cropped area. Other important crop isrice, all broad-cast.

Among the non food crops, fodder and cotton are important. The fodder grown in the village consists of juar and is known as 'chari', which is harvested before the grains mature. The stems are chopped and served as Cattle-fodder from November to March. Fodder covers one-tenth of the net cropped area. This percentage is comparatively higher than that in the village of Khajuri(cf.Table XXI) as perhaps, there is no provision for grazing grounds owing to the absence of waste land in the village.

Cotton covers about 5 per cent of the net cropped area and is a cash crop.[1] It is almost invariably sown on the good quality land. The picking of cotton is done by Women usually in the months of October and November. It is sold in the neighbouring markets of Rajpur, Pukhrayan and Sikandra. A comparisi n of Figs. 48 and 51 shows a close influence of soil on the crop pattern. Broad cast rice, maize, cotton and fodder occupy mostly the good quality lands and millets and pulses and bulrush millets are grown on the light sandy loam soil in the middle and south of the village.

(1) Cotton is grown at present only in the Yamuna Sengar tract in the Kanpur district. But on inquiry from the villagers the writer has come to know that the crop is loosing its importance and is being replaced by food cereals.

44.5 per cent of the gross cultivated area is left fallow in the kharif season as these lands are capable of producing only one crop a year.

Land Utilization in the Rabi Season

The use of land in the rabi season of 1960-61 is illustrated in Fig. 52. The following table shows the respective areas and the proportions of each crop produced in the rabi season:-

Table XXX

Gross cultivated area 367.40 acres
Net cropped area in the rabi season 280.68 acres

Crops	Area in acres	Percentage of gross cultivated area	Percentage of net cropped area	Total percentage of gross cultivated land	Total percentage of net cropped land
Grain Crops:-				70.58	92.38
Barley & Gram	77.38	21.06	27.57		
Peas	70.09	19.08	24.97		
Wheat	65.86	17.93	23.46		
Gram	40.25	10.96	14.34		
Wheat & Barley	3.56	0.97	1.27		
Barley	2.15	0.58	0.77		
Other Crops:-				5.82	7.62
Oil seeds	19.82	5.39	7.06		
Potatoes	0.63	0.17	0.22		
Vegetables	0.94	0.26	0.34		
Continual Kharif crops	78.40	21.34	...	21.34	...
Fallow	8.32	2.26	...	2.26	...
Total	367.40	100.00	100.00	100.00	100.00

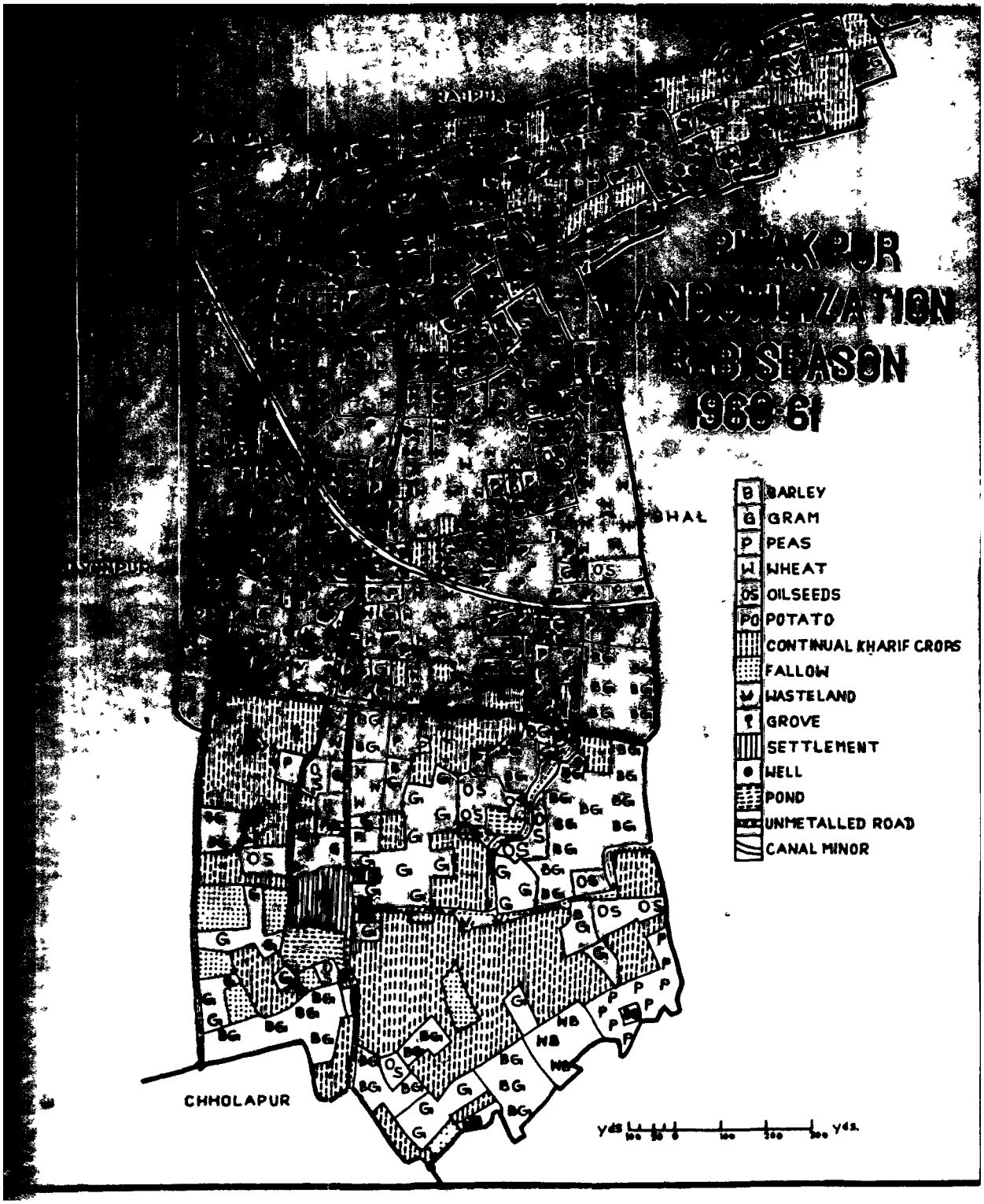
B BARLEY
G GRAM
P PEAS
W WHEAT
OS OILSEEDS
PO POTATO
CONTINUAL KHARIF CROPS
FALLOW
WASTELAND
GROVE
SETTLEMENT
WELL
POND
UNMETALLED ROAD
CANAL MINOR
CHHOLAPUR
yds.
yds.

Fig. 52

It will be seen from Table XXX that grain crops occupy a little over nine-tenths of the cropped area in the rabi season. Gram mixed with barley is the major crop and by itself occupies about 28 per cent of the net cropped land in the rabi season. Gram sown as a sole crop covers 14 per cent of the cropped area in the season and it is confined to those fields, which have been devoted to either rice, all-broad cast or cotton in the kharif season. Peas and wheat cover individually a little less than one-fourth of the net cropped area in the rabi. The fields, devoted to fodder and cotton crops usually in the kharif season have been adopted for peas in the rabi by cultivators.

Among the non-food cereals, oil seeds sown as a sole crop are mainly grown for cash and are sold in the markets of Rajpur.

Double cropped land

The total of the land cropped twice in the year 1960-61 was 119.97 acres or 32.65 per cent of the gross cultivated area. It will be seen from Fig.53 that the area under double cropping is confined to the good quality land. (A) The area under double cropping is restricted by the medium quality lands,(B) which are confined mainly to the south and south-east of the village and is not capable of bearing two crops, as (B) lands are without thefacility of irrigation and also less productive. Thus without the application of sufficient manures B lands cannot yield two crops a year.

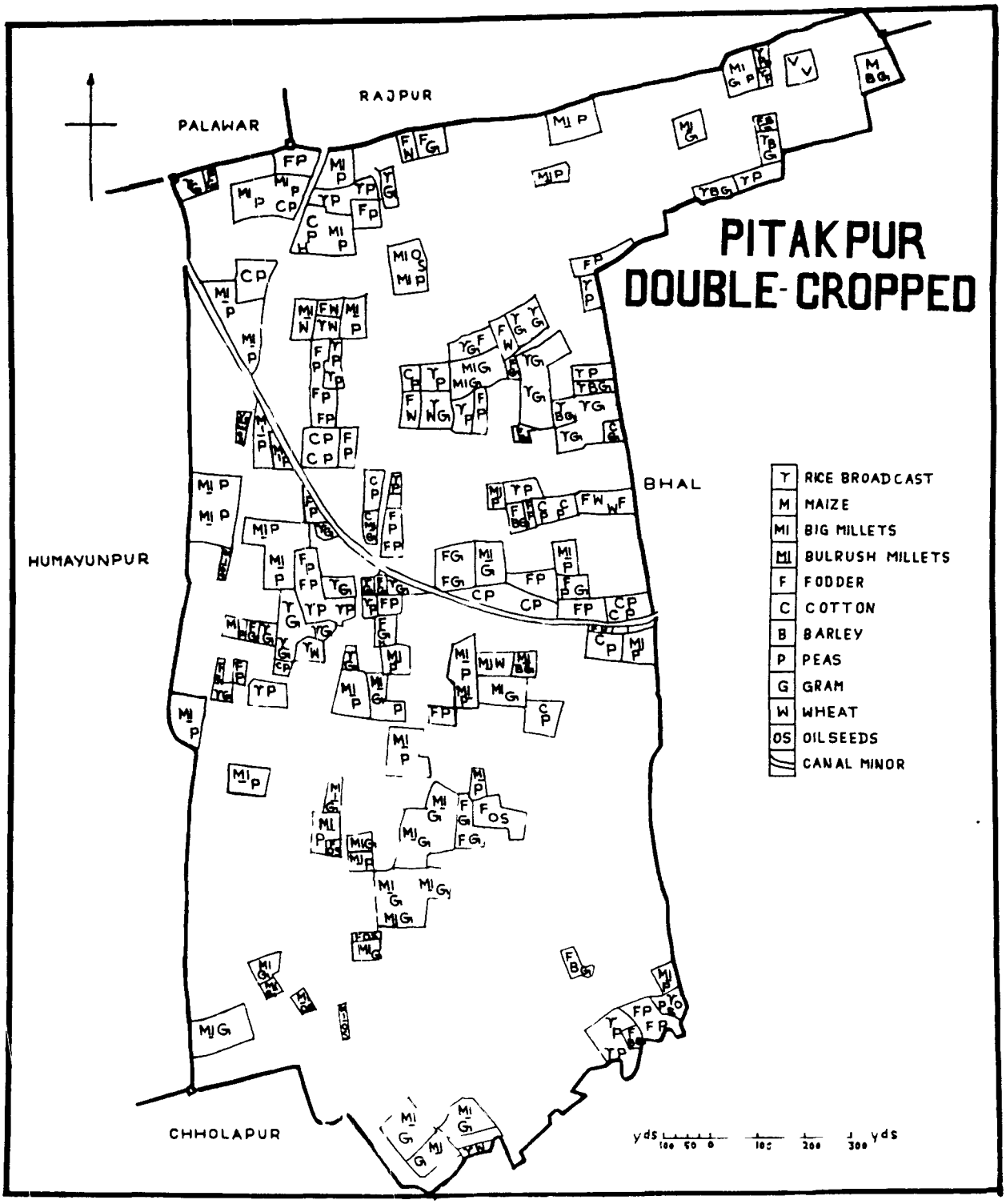
PITAKPUR
DOUBLE-CROPPED
RAJPUR
PALAWAR
BHAL
HUMAYUNPUR
CHHOLAPUR
T RICE BROADCAST
M MAIZE
MI BIG MILLETS
MI BULRUSH MILLETS
F FODDER
C COTTON
B BARLEY
P PEAS
G GRAM
W WHEAT
OS OILSEEDS
CANAL MINOR
yds 100 50 0 100 200 300 yds

Fig. 53

Land use and Population

The following Table indicates the totals of various categories of lands in the village and the per capita share of the villagers in these lands.

Table XXXI

Total population[1] of the village, actually depending upon the produce of the village---448

	Total area of the village	Total availabe land for cultivation	Net cropped land in the kharif season	Net cropped land in the rabi season	Total cultivated land both of kharif & rabi	Dobble cropped land
Area in acre	392.12	367.40	203.69	260.68	464.37	119.97
Land per head of population	0.88	0.82	0.45	0.63	1.08	0.26

It will be seen from the above Table that the gross cultivated land per head is 0.82 acre, but owing to the

(1) Actual population of the village is 334 as enumerated in 1961 census. Number of persons of out side village, depending upon the produce of the village is 164 and the number of persons, who do not depend actually upon the produce of this village is 50. Thus the total number of population, depending upon the produce of the village is(334 + 164 - 50)= 448.

practice of fallowing the per capita land is reduced to 0.45 acre, while the continual kharif crops bring cultivated land in the rabi season to 0.63 acre. The per capita net cultivated land in both of the kharif and rabi seasons is 1.08 acres, or in other words the amount of cultivated land supporting one person in Pitakpur is 1.08 acres.

The population mainly belongs to the primary rural group. About 92 per cent of the total population[1] directly depends upon the land, while 8 per cent consists of the secondary rural population, which serves the primary rural population through essential and ancillary services, thus indirectly depending upon land.

The standard of living and health of the people is good. The village is self sufficient in its produce. The productive capacity of the culturable land is comparatively larger than that of the villages of Harbaspur and Deheli. The following Table shows the Potential Production units of the village.

Table XXXII

Average yield per acre of good [illegible] 960 lb. = 1 P.P.U.

Types of land	Area in acres	Average yield in lb. per acre	Productivity rating per acre	Number of P.P.U.
Good quality land (A)	119.97	1640	1.7	203.64
Medium quality land (B)	247.43	960	1.0	247.43
Poor quality land (C)	3.26	..	..	..
Total	370.66	..	..	451.07

(1) Data based upon the personal inquiry by the writer.

It will be seen from Table XXXII that the total productive capacity of the village is 4518.P.U., which is obtained from 370.66 acres of cultivable land. It has been discussed in foregoing pages that further extension of cultivated land in this village is not possible as the wasteland occupies a very small share of the total area. Thus the productive capacity of the village can be increased only by converting some of the medium quality lands into good quality lands . By such conversion of land not only the production may be increased but also the area under cash crops such as cotton and oil seeds may be augmented.

C_H_A_P_T_E_R VI

GROUP II : LOWLAND PLAINS :

Khondhan

Palikhurd

Sarup pur

Kunwarpur

LAND UTILIZATION IN KHONDHAN

Location

The village of Khondhan lies in Bilhaur tahsil in the district of Kanpur. The village is situated on the left bank of the Kanpur branch of the Lower Ganges canal and stands in $26^{0}41'$N lat., and $80^{0}1'$E long. Located in the low-lying and ill-drained Ganga-Pando tract, it is bounded by the villages of Nadiha Buzurg in the north, Kunwarpur Kukri and Rampur Sakhraj in the east; Sujjapur and Sakhraj in the south and Kamalpur in the west. As a result of bad drainage, a number of seasonal ponds and swamps (Fig. 54) are flooded in the wet monsoon months and small drainage channels are excavated by the inhabitants of the village. The over flow finds its way into the canal. Most of the ponds and swamps dry up in the hot weather season, while in the wet monsoon months they are joined by the seasonal channels. A number of nalas and minor

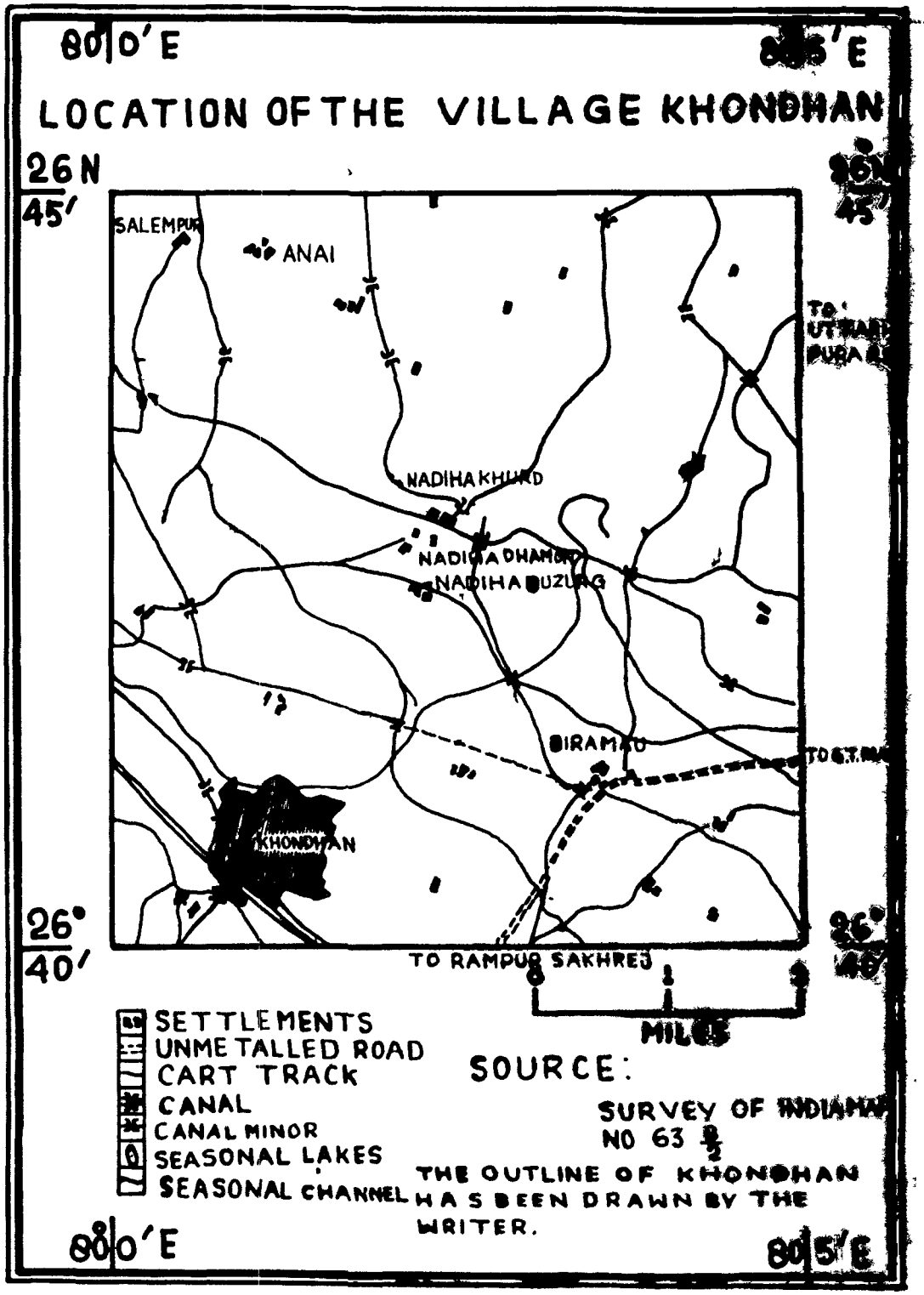
80 0' E
80 5' E
LOCATION OF THE VILLAGE KHONDHAN
26 N
45'
SALEMPUR
ANAI
NADIHA KHURD
NADIHA DHANGAD
NADIHA BUZURG
BIRAMAU
KHONDHAN
26°
40'
TO RAMPUR SAKHREJ
MILES
SETTLEMENTS
UNMETALLED ROAD
CART TRACK
CANAL
CANAL MINOR
SEASONAL LAKES
SEASONAL CHANNEL
SOURCE:
SURVEY OF INDIA MAP
NO 63 B/2
THE OUTLINE OF KHONDHAN HAS BEEN DRAWN BY THE WRITER.

Fig. 64

streams take their rise from these swamps, for example, the Uttari Non takes its rise from Harnu swamp at a distance of about two and a half miles from the village, which serves as the main drainage line of the area. Owing to the defective drainage, there occur patches of wasteland infested with salt effloreseence in various parts of the plain.

The village is accessible by a cart track, which extends from the village to Nadiha Buzurg and ultimately connects the village with Uttripura, which is situated on the Gran Trunk Road and is also a railway station on the North-Eastern Railway(Fig. 54). Regular train and bus services are available for Kanpur and Bilhaur from Uttripura. Kanpur and Bilhaur lie 34 and 13 miles to the north-east and north-west of the village respectively.

The village has, therefore, an easy access to the market of Uttripura as well as to the tahsil headquarters of Bilhaur. But during the wet monsoon months inundating seasonal channels, swamps and lakes make communication extremely difficult. The village is water-logged and lies hemmed in between the main branch of the lower Ganga Canal and Taktauli Distributary (Fig.54) without proper means of drainage. The chief source of local transportation is horse during the wet monsoon months.

Climate

The nearest rainfall recording station is Bilhaur. The data of rainfall recorded at the tahsil headquarters

of Bilhaur are indicative of the climatic conditions of the village and therefore have been given in the following Tables.[1]

Table XXXIII

KKharif Season 1960 (Bilhaur)

	MONTHS					
	June	July	August	September	October	Total
Rainfall in inches in the kharif season, 1960	(1.21	23.61	9.60	4.61	11.36	50.40
Rainy days in kharif, 1960	2	17	18	9	5	51
Average rainfall in inches	2.99	9.31	10.00	6.42	1.34	30.06

Table XXXIV

Rabi Season 1960-61 (Bilhaur)

	MONTHS					
	November	December	January	February	March	Total
Rainfall in inches in the rabi season 1960-61.	...	...	1.48	1.30	0.25	2.93
Rainy days in rabi 1960-61	...	...	6	3	3	12
Average rainfall in inches	0.01	0.21	0.80	0.41	0.22	1.65

(1) The rainfall data for the khatif and rabi seasons of 1960-61 were ob ained from the headquarters of district Kanpur.

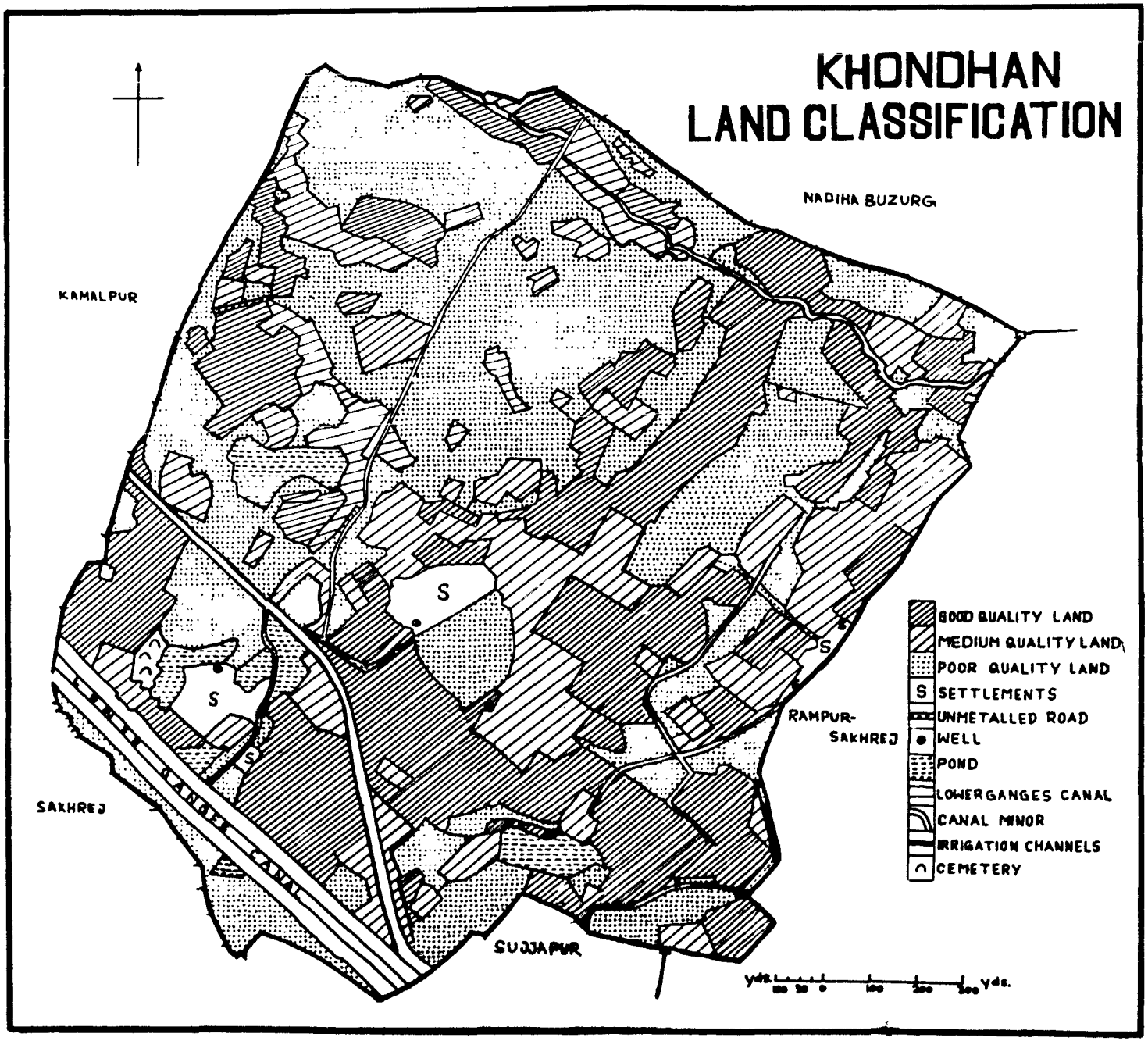
KHONDHAN
LAND CLASSIFICATION
NADIHA BUZURG
KAMALPUR
SAKHREJ
RAMPUR-
SAKHREJ
SUJJAPUR
S
C
GOOD QUALITY LAND
MEDIUM QUALITY LAND
POOR QUALITY LAND
SETTLEMENTS
UNMETALLED ROAD
WELL
POND
LOWERGANGES CANAL
CANAL MINOR
IRRIGATION CHANNELS
CEMETERY
Yds.
Yds.

Fig. 55

LAND CLASSIFICATION

On the basis of the fertility and productivity (see page.57.) the village fields have been differetiated in Fig. 55. The soil of the good quality lands (A) is clayey loam. These lands yield two crops a year or are devoted to sugarcane of the medium quality lands (B), the soil is from clayey to loamy clay and is less productive than (A). B lands are left fallow in the kharif season or are devoted to millets and pulses, e.g., *juar and arhar*. The patches of clayey soil are reserved for transplanted rice.[1]

The soil of the poor quality land (C) is rendered unproductive, because the saline efflorescence known as *reh* abounds in these usarlands, which is wide spread in the village, especially along the Kanpur branch of the Lower Ganga canal and Taktauli distributary.

Irrigation

Facilities for canal-irrigation are ample in the village. The Taktauli distributary of the Kanpur branch of of the Lower Ganga canal flows through the southern part of the village (Fig. 56). The area irrigated in the kharif and rabi seasons for the year 1960-61 is shown in Fig. 56. It will be seen from Table

---

(1)Patches of clayey depressions are locally known as jhabar.

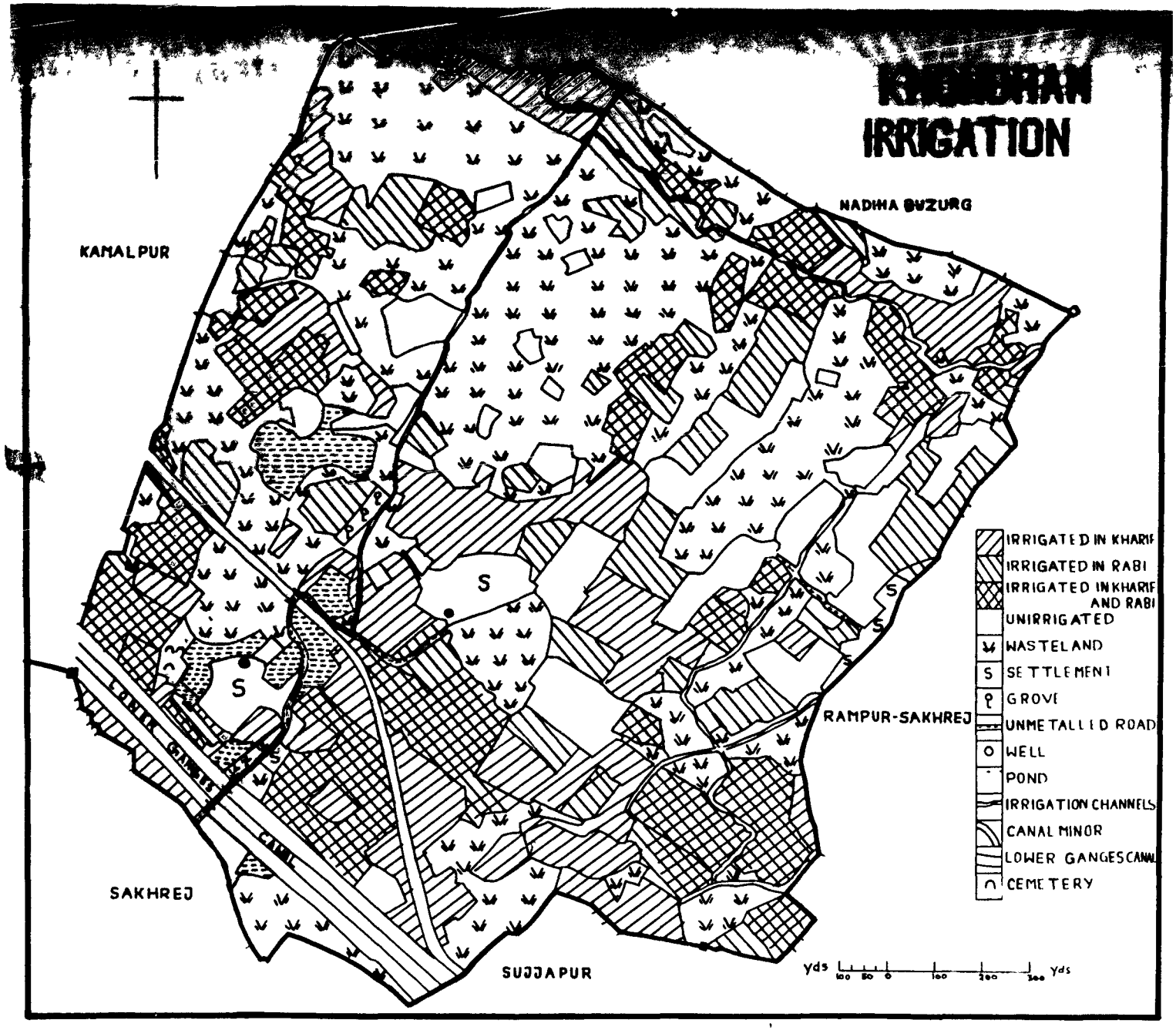
IRRIGATION
NADHA BUZURG
KAMALPUR
RAMPUR-SAKHREJ
SAKHREJ
SUJJAPUR
IRRIGATED IN KHARIF
IRRIGATED IN RABI
IRRIGATED IN KHARIF AND RABI
UNIRRIGATED
WASTELAND
SETTLEMENT
GROVE
UNMETALLED ROAD
WELL
POND
IRRIGATION CHANNELS
CANAL MINOR
LOWER GANGES CANAL
CEMETERY
Yds
Yds

Fig. 56

XXXIII that the total rainfall in the first four months of the kharif season was over 38 inches and was higher than the average amount of rainfall. Therefore none of the kharif crops, except rice broadcast and sugarcane was irrigated. There was heavy rainfall in the month of October, which led to water logging and affected the standing crops.[1]

Table XXXIV shows that November and December were entirely dry, therefore, wheat, patatoes and sugarcane were irrigated in the last week of December. But as the amount of rainfall for the months of January and February was 2·68 inches, none of the rabi crops except potatoes required second watering.

Land Utilization

The land use of the village in 1960-61 is shown in Figs. 57 to 60 which are based on the writer's field work of the village.[2]

Table XXXV gives a summary of the proportions of the village lands devoted to various uses in 1960-61(Fig. 57).

---

(1) An excessive amount of rainfall in the month of October not only delayed the sowing of rabi crops but affected also a few kharif crops such as big or small millets.

(2) The base map showing the fields and their areas in acres was obtained from the Lekhpalof the village concerned with the permission of tahsildar of the Bilhaur tahsil. The village was visited by the Writer in the kharif season of 1960 and the rabi season of 1961 and the use to which each field was being put was recorded on the base map. From these data Figs. 57-60 were prepared.

Table XXXV

Total area of the village ------ 477.49 acres

Use of land	Area in acres	Percentage of the total area
Cultivated land[1]	242.09	50.70
Wasteland[2]	179.87	37.68
Grove	0.83	0.18
Settlement	8.91	1.87
Grave yard	0.38	0.08
Road	3.34	0.69
Pond	17.02	3.57
Seasonal channel	3.33	0.68
Irrigation channel	21.72	4.55
Total	477.49	100.00

It will be seen from the above table that 50% of the total area of the village is cultivated., 38 per cent is unproductive, while 11 per cent is devoted to non-agricultural uses.

The use of land in the village is far from balanced and needs improvement. The proportion of the cultivated

(1) Cultivated lands include current fallows in the year of inquiry.
(2) Wastelands refer to usarlands, that lie untitilized due to the presence of reh.

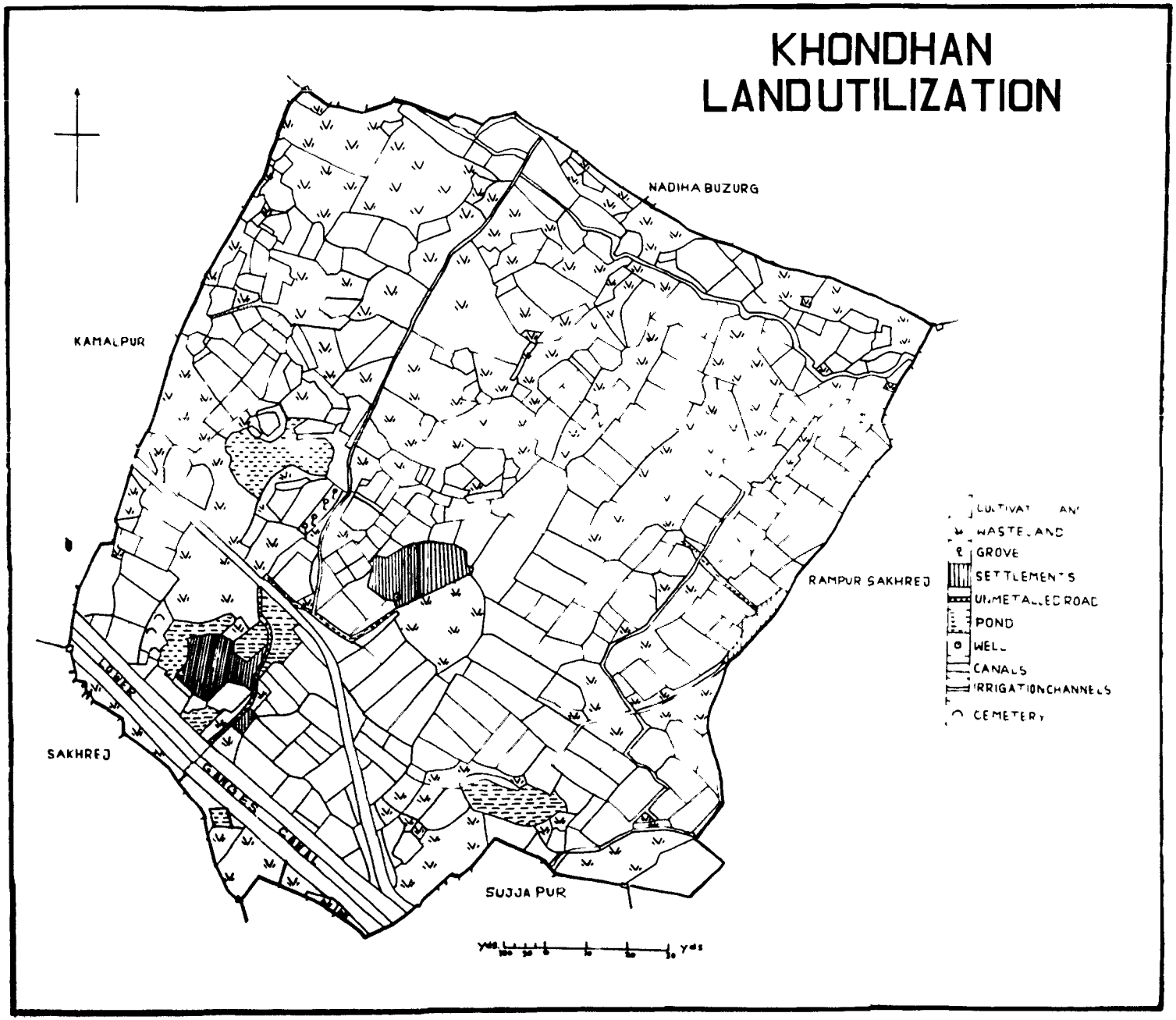
KHONDHAN
LANDUTILIZATION
NADIHA BUZURG
KAMALPUR
RAMPUR SAKHREJ
SAKHREJ
SUJJA PUR
CULTIVATED
WASTE LAND
GROVE
SETTLEMENTS
UNMETALLED ROAD
POND
WELL
CANALS
IRRIGATION CHANNELS
CEMETERY

Fig. 57

land is not large due to the presence of usar lands. The cultivated land also suffers a great loss from a noxious Weed called 'rasin,' which spreads rapidly and is practically ineradicable due to great depths to which its roots penetrate below the surface. It increases the cost of cultivation by repeated weedings. The weed is capable of checking the growth of crops during a succession of the seasons of drought. The area under groves, which is only 0.13 per cent of the total area of the village, needs extension. Further more it will be seen from Table XXXV that nearly 38 per cent of the land is not utilized due to the presence of salts in high proportion. The patches of usar are wide spread through out the village. During the wet monsoon months, these lands are covered with occasional patches of grass, while in the hot weather season they are covered with crusts of saline efflorescence. These lands can be utilized for grazing purpose or for growing fuel trees. Besides dhak (Butea frondosa), which survives well on usarlands and grows freely in the village, babul (Acacia arabica) can be propagated. Babul can not only be planted in the usarland, but it can be scattered in cultivated lands with lightsoils. Being a deep rooted species, it does not compete for nutrition in the upper layers of soil, which support agricultural crops. It provides excellent fodder, fuel, tanning bark and timber. Above all, its attenuated leaf surface and the nature of its crown do not shade crops to affect production. The Writer has observed that the crop underneath ripens about a week or so later. Casuarina can also be planted inthe wastelands, which matures quickly, reaching a height of 15 feet in three or four years. It yields fire wood and helps in nitrogen fixation in the soil. Thus it willbe seen

that the plantation of these trees will not only provide cheap fuel, but release cow dung for manurial purposes. Such plantations would cheack also both wind borne and fluvial erosion.

A comparison of Figs. 55 and 57 shows thw influence of the quality of the land on the size of the fields. The fields of the good quality lands(A) are very small in size, the fields of the medium quality lands (B) are fairly large but the size of the fields of the poor quality lands (C) is larger than that of the medium quality lands. The following Table will show the size of the fields of different categories.

Table XXXVI

Size of plots	Number of plots of each size	Percentage of the plots of each size to the total No. of the plots
Below 0.50 acre	166	37.7
0.50 acre to 1 acre	120	27.3
1.0 acre to 2.0 acres	101	22.9
2.0 acre to 3.0 acres	27	6.1
over 3.0 acres	26	6.0
Total	440	100.00

It will be seen from the above table that 65 per cent of the total number of plots are below 1 acre in size, while the plots of the medium quality lands vary between 1 to 2 acres

in size and cover another 23 per cent. Plots containing salts vary between 2 and 3 acres or more than that and they are wide spread in the village.

Land Utilization in the Kharif Season

The use of land in the kharif season of 1960 is shown in Fig. 58. The area occupied by each crop in this season is shown in the following Table.

Table XXXVII

Gross cultivated land 242.09 acres
Net cropped land in the kharif season 190.58 acres

Crops	Area in acres	Percentage of gross cultivated land	Percentage of net cropped land	Total percentage of gross cultivated land	Total percentage of net cropped land
GRAIN CROPS:-				74.84	95.09
Transplanted rice	93.99	38.82	49.32		
Rice broadcast	49.53	20.53	26.00		
Maize	17.69	7.31	9.28		
Millets and pulses	13.49	5.57	7.08		
Big millet	6.33	2.61	3.32		
OTHER CROPS:-				3.88	4.91
Fodder	4.86	2.01	2.55		
Sugarcane	3.19	1.32	1.67		
San hemp	1.32	0.55	0.69		
Fallow	51.51	21.28	..	21.28	..
Total	242.09	100.00	100.00	100.00	100.00

The above Table shows that rice is the major crop in the kharif season and occupies three-fourths of the net cropped

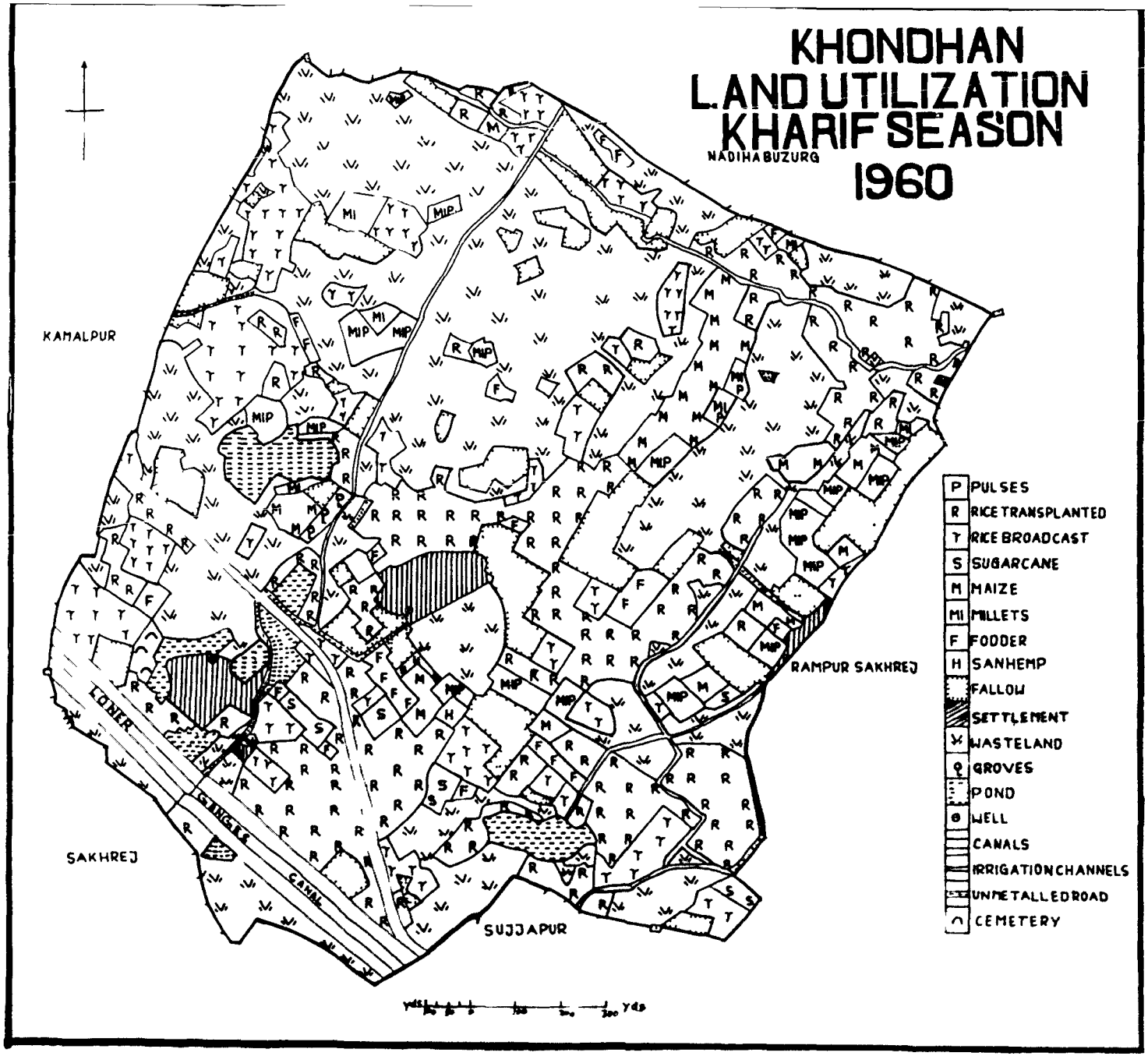
KHONDHAN
LAND UTILIZATION
KHARIF SEASON
1960
NADIHA BUZURG
KAMALPUR
RAMPUR SAKHREJ
SAKHREJ
SUJJAPUR
LOWER GANGES CANAL
P PULSES
R RICE TRANSPLANTED
T RICE BROADCAST
S SUGARCANE
M MAIZE
MI MILLETS
F FODDER
H SANHEMP
FALLOW
SETTLEMENT
WASTELAND
GROVES
POND
WELL
CANALS
IRRIGATION CHANNELS
UNMETALLED ROAD
CEMETERY

Fig. 58

land. Maize is the next important crop, which covers a little less than one-tenths of the net cropped area in that season. Fooder and sugar cane together claim only 4.22 per cent. The presence of clayey and loamy clay, an adequate amount of rainfall (37.6 inches) during the wet monsoon months with temperatures ranging between 85 to 100°F and ample facilities of canal irrigation present favourable conditions for the growth of rice in the village.

The area under sugarcane in the village needs to be extended. The acreage under sugarcane has been considerably reduced in the year of inquiry due to increase in the rates of canal irrigation which have nearly been doubled.[1] A little more than one-fifth of the gross cultivated land is left fallow in the kharif season. This process exposes the land to sheet erosion. Creeping pulses such as moong, ur-d and lobia and green manuring crops such as Sanhemp(sanai) and dhaincha may be introduced on these lands.[2] These crops will not only save the land from soil erosion but will also help in building up the fertility of the soil. Dhaincha is an ideal green manure crop for the reclamation of usar lands. An advantage with this crop is that it can be grown under adverse conditions of drought, water logging, salanity etc. without much difficulty. It has shown great promise as a good soil reclaming crop and providing nitrogen to the soil.

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(1) The rate of irrigating one acre of sugarcane is Rs. 32/-.
(2) The botanical names of sanhemp and dhaincha are Crotaloria juncea and Sesbania aculeata respectively.

Dhaincha crop possesses an extensive root system and therefore exerts considerable shattering influence on the subsoil. Dhaincha can also be transplanted on the border of the fields of transplanted rice.[1] Dhaincha and Paddy could also be sown as a mixed crop in lines in unirrigated areas. Dhaincha and Sanhemp seeds could be aided in gaps between sugarcane rows.

Land Utilization in the Rabi Season

The use of land in the rabi season of 1960-61 is shown in Fig. 59. The area occupied by each crop in this season is shown in Table XXXVIII

Table XXXVIII

Gross cultivated area 242.09 acres
Net cultivated area in the rabi season 182.00 acres

Crops	Area in acres	Percentage of gross cultivated land	Percentage of net cropped land	Total percentage of gross cultivated land	Total percentage of net cropped land
GRAIN CROPS:				74.41	98.98
Wheat	95.15	39.30	52.28		
Barley	59.69	24.66	32.79		
Peas	11.97	4.94	6.58		
Wheat & barley	10.55	4.36	5.80		
Wheat & gram	2.79	1.15	1.53		
OTHER CROPS:-				0.77	1.02
Potato	1.85	0.77	1.02		
Continual kharif crops	16.68	6.89	...	6.89	..
Fallow	43.41	17.93	...	17.93	..
Total	242.09	100.00	100.00	100.00	100.00

(1) A small nursery for dhainch/a seedlings should be raised along with the paddy norsery, when the dhaincha seedlings are about 16-18 inches high, they should be transplanted.

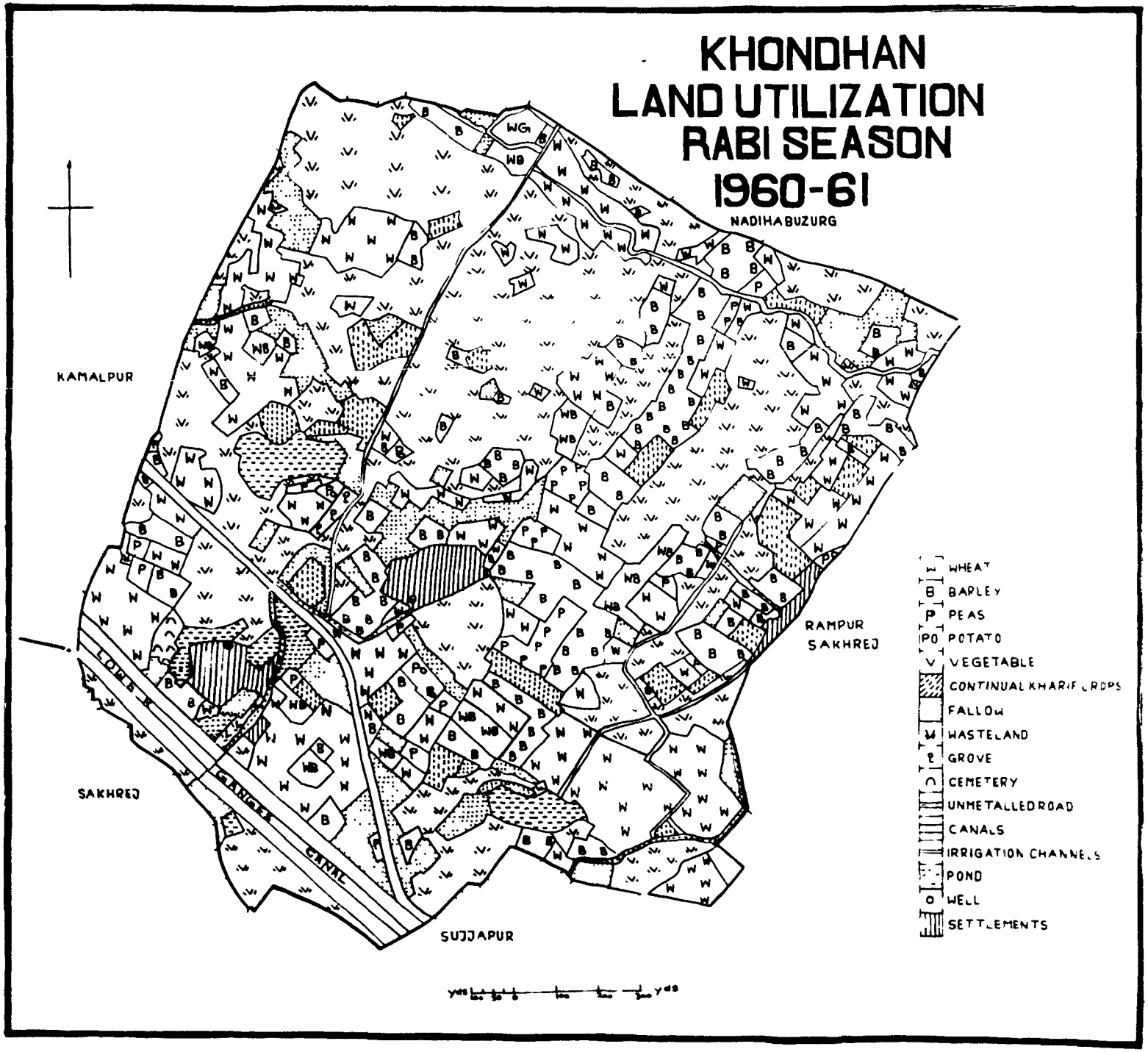
KHONDHAN
LAND UTILIZATION
RABI SEASON
1960-61
NADIHA BUZURG
KAMALPUR
RAMPUR
SAKHREJ
SAKHREJ
SUJJAPUR
GANGES CANAL
WHEAT
BARLEY
PEAS
POTATO
VEGETABLE
CONTINUAL KHARIF CROPS
FALLOW
WASTELAND
GROVE
CEMETERY
UNMETALLED ROAD
CANALS
IRRIGATION CHANNELS
POND
WELL
SETTLEMENTS

Fig. 59

It will be seen from Table XXXVIII that more than half of that net cropped landis occupied by wheat. Next to wheat in importance is the barley, which covers another one-third area of the net cropped land. A comparison of Figs.55 and 59 shows that while wheat and peas occupy the good quality lands, barley occupies the medium quality lands. Potatoes occupy 1.02 per cent of the net cropped area. They are only grown for domestic consumption. The area under potatoes could be extended on the good quality lands and the villagers can earn extra income from selling potatoes to the neighbouring markets.

Double Cropped Land

The total of the area cropped twice in the year was 130.49 acres or 53.96 per cent of the gross cultivated land. It will be seen from a comparison of Figs. 55 and 60 that the area under double cropping is restricted mainly to the good quality land. Even paddy fields produce two crops a year. Rice is followed by wheat or wheat and barley or peas. The village on the whole possesses canal irrigation facilities. But the yields of crops are not very high, as these fields are not properly manured.[1] Some of the fields of the good quality land are devoted to sugarcane, which occupies the fields for almost the whole of the year consequently, the area under double cropping is reduced. The double cropping can be extended on the medium quality lands with the help of manures.

(1)The average yields of maize, wheat, and big millet are 620, 600 and 370 lb. per acre respectively.

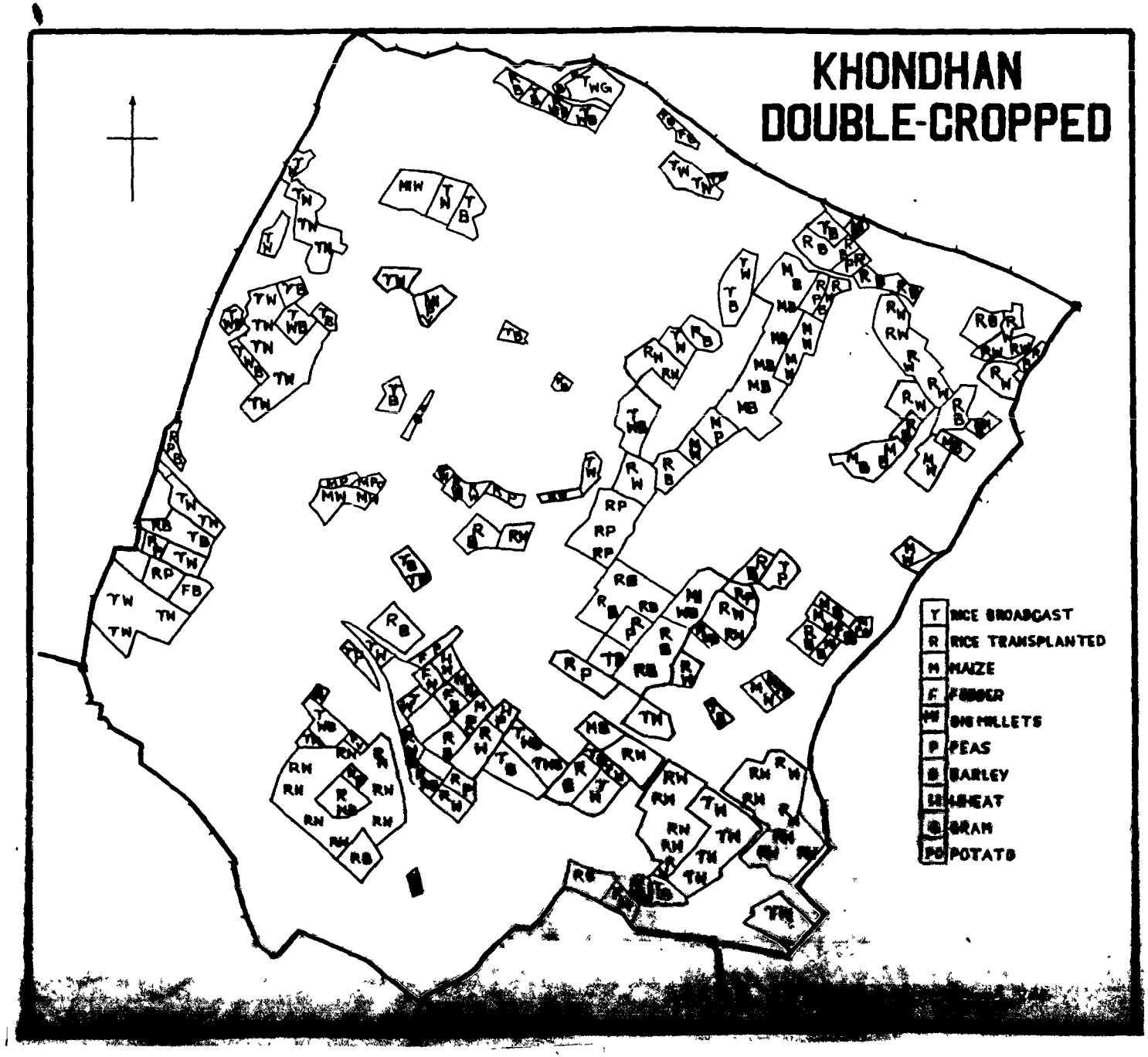
KHONDHAN
DOUBLE-CROPPED
T RICE BROADCAST
R RICE TRANSPLANTED
M MAIZE
F FODDER
MI MILLETS
P PEAS
B BARLEY
W WHEAT
G GRAM
PO POTATO

Fig. 60

Land use and Population

The following Table shows the totals of various classes of lands as well as the per capita share of the villagers in these lands.

Table XXXIX

Total population of Khondhan depending upon the produce of the village.....350[1]

	Total area of the village	Total available land for cultivation	Net cropped land in the kharif season	Net cropped land in the rabi season	Total cultivated land both of kharif & rabi	Double cropped land
Area in acres	477.49	242.09	190.58	182.00	372.58	130.49
Land per head of Population	1.36	0.69	0.54	0.52	1.06	0.37

Table XXXIX shows that the per capita cultivated land available in the village is 0.69 acre, but in the kharif and rabi seasons the per capita land is reduced to 0.54 and 0.52 acres respectively. The reduction inthe per head cultivated land in the kharif

(1) The population data have been collected by the Writer for 1961 at the time of census from the enumerator concerned. Actually, the population of the village is 208, but 152 persons of the other villages also depend upon this village by cultivating the lands of this village, while 10 persons of this village depend upon the produce of other villages. Therefore (208+152-10)= 350 persons actually depend upon the produce of the village.

season is due to the practice of fallowing, while in the rabi season the reduction is caused by the continual kharif crops, e.g., Sugarcane pulses (arhar)[2] and transplanted rice, which occupy the land for whole or part of the rabi season.

Table XXXIX further reveals that the per capita land cropped twice in the year is 0.37 acre, while the total cultivated land both of kharif and rabi seasons is 1.06 acres. In other words, the amount of land supporting one person in Khondhan is 1.06 acres. No less than 315 persons (90 percent of the total population) belong to the primary rural group and depend upon the land, while 10 per cent of the population is secondary rural and serves the primary rural population.

The Writer during his visit to the village found that the standard of living of the people was above the average. The people are in good health. Rice is the main diet of the people. The village is self sufficient in its produce. But the standard of lving can be improve further by increasing the per capita of cultivated land. The following Table shows the potential production units (P.P.U.) of the village.

Table XXXX

Average yield per acre of good farm land-
1640 lb. = 1 P.P.U.

Types of land	Area in acres	Average yield in lbs. per acre	Productivity rating per acre	Number of P.P.U.
Good quality lands(A)	133.68	1820	1.11	148.38
Medium quality lands(B)	108.41	1640	1	108.41
Poor quality lands (C)	179.87	..	..	...
Total	421.96	..	..	256.79

It will be seen from Table XXXX that 257 P.P.U. are obtained from 421.96 acres of culturable land. If the poor quality land can be reclaimed and brought to the level of medium quality land, atleast 180 P.P.U. can further be added in the existing total of P.P.U. and the productive capacity of the village can be increased.

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LAND UTILIZATION IN PALIKHURD

Location

The village Palikhurd lying in the south of the tahsil Kanpur of the district, is situated in $26^{0}17'N$ latitude and $80^{0}28'E$ longitude. Located in a level and fairly drained Ganga-Pando tract of the Ganga lowland region, it is bounded by the villages of Palikalan and Tusora in the north, Behtasakath in the east, Samerua and Khujauli in the south and Bhogipur in the west.

The river Pando meanders in a well defined channel at a distance of about two miles to the south of the village. The drainage of the village is some what fair than that of the village Khondhan, which also lies in the same tract of the Ganga lowland on its western side.

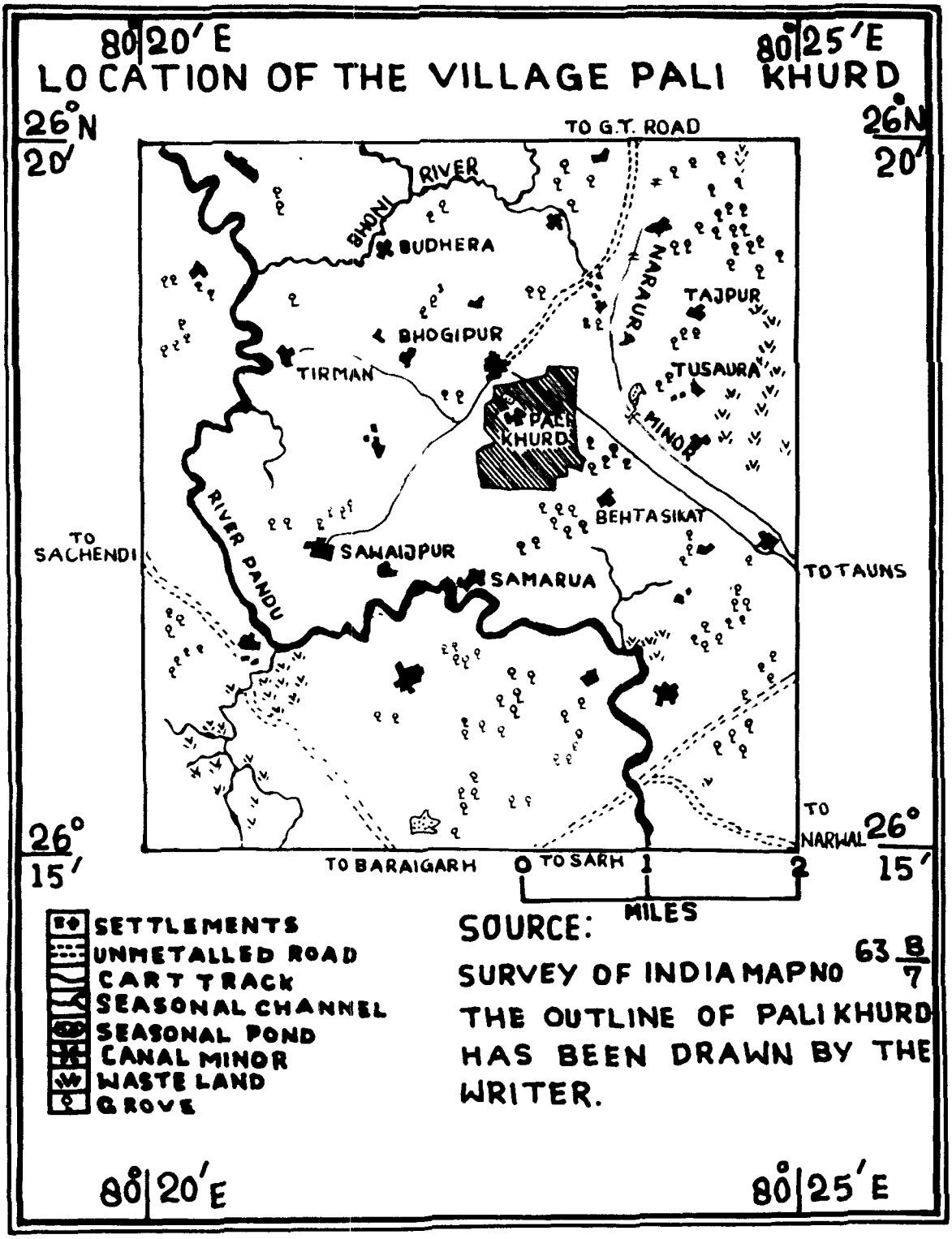
80° 20′ E
80° 25′ E
LOCATION OF THE VILLAGE PALI KHURD
26° 20′ N
26° 15′
TO G.T. ROAD
BHONJ RIVER
BUDHERA
NARAURA MINOR
TAJPUR
BHOGIPUR
TUSAURA
TIRMAN
PALI KHURD
BEHTASIKAT
TO SACHENDI
SAHAIJPUR
SAMARUA
TO TAUNS
RIVER PANDU
TO NARHAL
TO BARAIGARH
0 TO SARH 1 2
MILES
SETTLEMENTS
UNMETALLED ROAD
CART TRACK
SEASONAL CHANNEL
SEASONAL POND
CANAL MINOR
WASTE LAND
GROVE
SOURCE:
SURVEY OF INDIA MAP NO 63 B/7
THE OUTLINE OF PALI KHURD HAS BEEN DRAWN BY THE WRITER.

Fig. 61

The village is accessible by an unmetalled road[1] seven miles in length, running to the west of the village. It passes through the village of Pali Kalan, and joins the Grand Trunk Road near Chakeri Station of the Northern Railway in the north-west. Another cart track running to the village, joins the metalled[2] road (Fig.61) at the village of Tauns in the south. This metalled road terminates at the village of Narwal, which is 6 miles to the south-east of the village. The village has, therefore, an easy access to Kanpur, as well as to the rural markets of Palikalan and Narwal. But during the rains the neighbouring villages lying to the north, north-east and north-west of palikalan become waterlogged where overflow of surplus water flowing from low lying lands makes communication difficult.

Climate

No climatic data are recorded in the village. The data of rainfall for Kanpur, which is situated at a distance of about 14 miles to the north-west of the village, may be taken as close approximation for the village. The data have already been given in Tables XI and XII on pages 83 & 84 which are indicative of rainfall for Harbaspur.

Land classification

The Writer has made an attempt to classify the village fields on the basis of fertility and productivity of the

(1) An unmetalled road known as Ganpati Singh Road has recently built by the old Landlord Thakur Ganpat Singh of Palikalan. Private bus service is available directly from Palikalan to Kanpur during the dry months of the year.

(2) This metalled road 7 miles in length is the small branch of Grand

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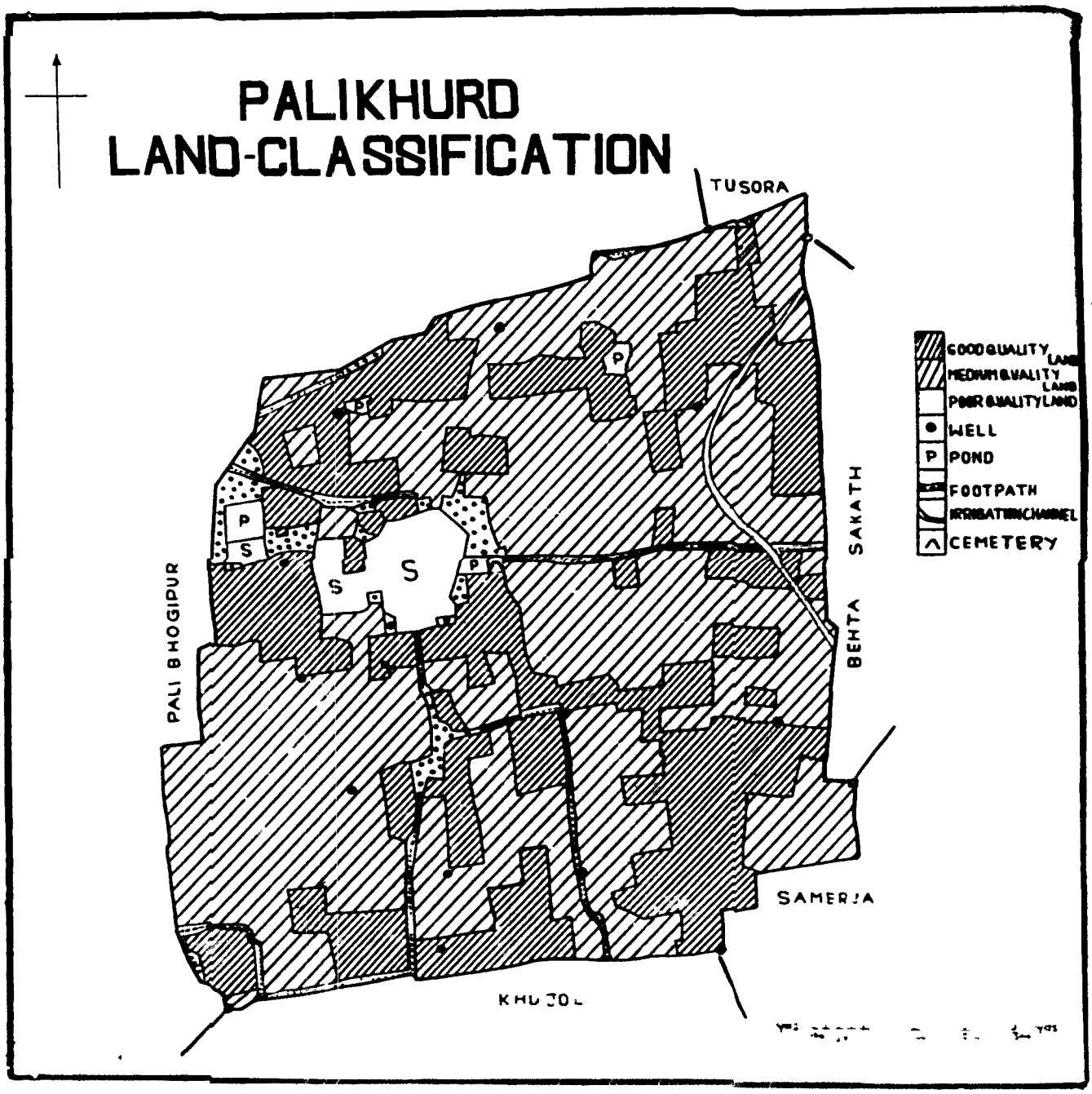

PALIKHURD
LAND-CLASSIFICATION
TUSORA
PALI BHOGIPUR
BEHTA SAKATH
SAMERJA
KHUJOL
GOOD QUALITY LAND
MEDIUM QUALITY LAND
POOR QUALITY LAND
WELL
POND
FOOTPATH
IRRIGATION CHANNEL
CEMETERY
P
S

Fig. 62

soil (see Page 57). They have been differentiated in Fig. 62. The soil of the area in which the village is situated is mainly clayey loam. (Fig. 25). The good quality lands (A) possess loamy soil and are used either for raising two crops a year or devoted to sugarcane, mango groves and guava-gardens. The soil of the medium quality lands (B), consists of light sandy clayey loam and is less productive than (A). The B lands are left fallow in the kharif season or are given to millets mixed with pulses. The plots falling in the grade of lowest fertility such as 'Banjar' lands are classed as poor quality lands(C). But Usar lands are entirely absent from the village while the village Khondhan lying in the same soil tract of Ganga lowland contains 37.68 per cent Usar lands of the total area(See Table XXXV on page 129). But usar is dominant in the neighbouring villages of palikhurd. It shows that in the proximity of the village water-logging is not caused.

Irrigation

The village on the whole possesses adequate facilities of canal irrigation. The Tirman and Sawaijpur minors rising from Narora distributary of the Halwakhanda branch of the Lower Ganga canal irrigate the entire village. Irrigation in the village is also carried on from the wells by pur and chaudhi methods. The area irrigated in the kharif and rabi seasons during the year 1960-61 is shown in Fig. 63. The accompanying map also shows the distribution of wells in the village. It will be noted from Table XI(page 83)

Contd..2- Trunk Road connects the two villages of Narwal and Maharajpur, the latter being 12 miles south-east of Kanpur. Regular Govt. Roadways service is available from Kanpur to Narwal.

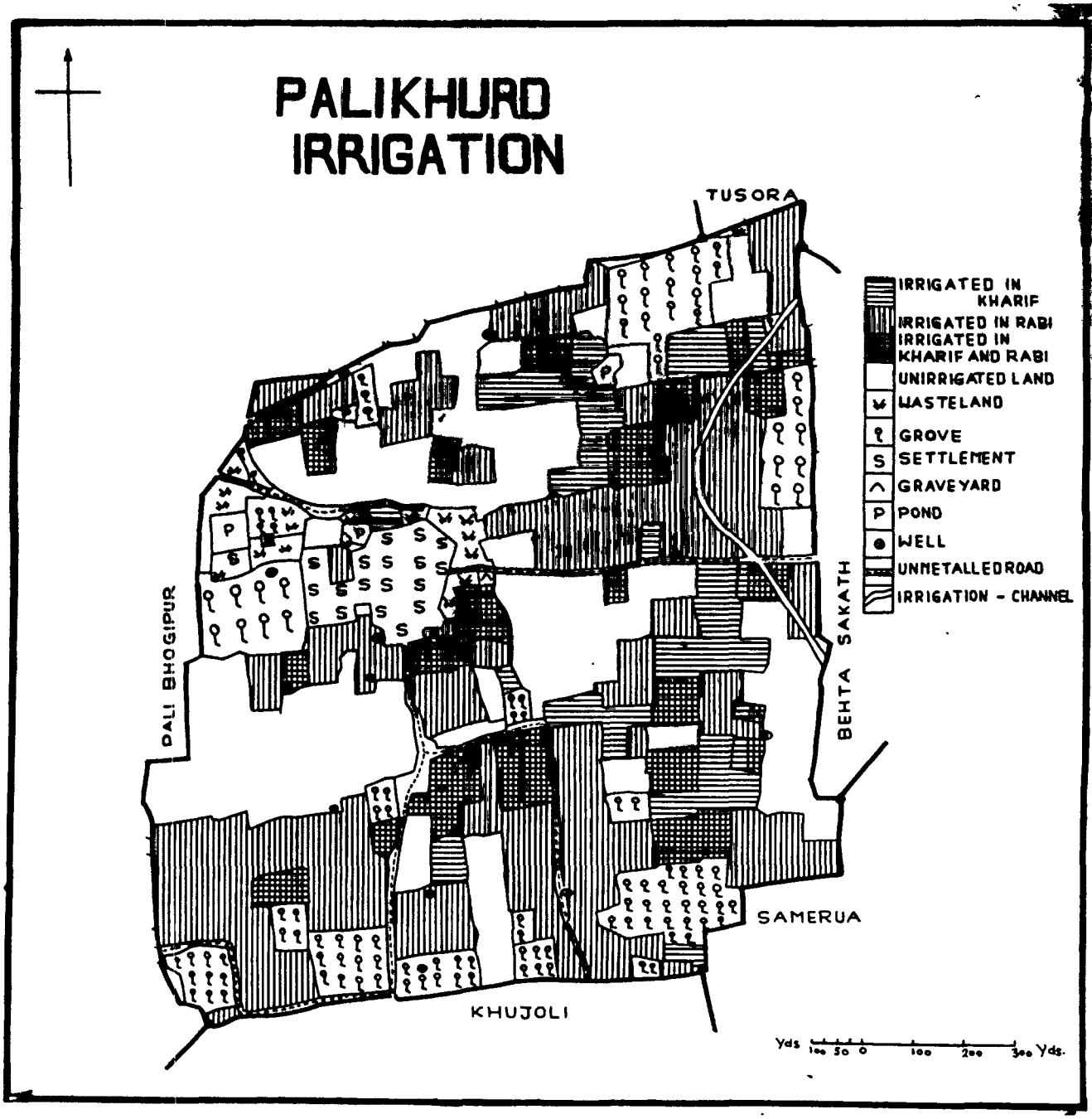

PALIKHURD
IRRIGATION
TUSORA
PALI BHOGIPUR
BEHTA SAKATH
SAMERUA
KHUJOLI
IRRIGATED IN KHARIF
IRRIGATED IN RABI
IRRIGATED IN KHARIF AND RABI
UNIRRIGATED LAND
WASTELAND
GROVE
SETTLEMENT
GRAVEYARD
POND
WELL
UNMETALLED ROAD
IRRIGATION - CHANNEL
Yds 100 50 0 100 200 300 Yds.

Fig. 63

that the total rainfall in kharif season in the year under review was over 30.4" and was spread over sufficient number of days in the month of July and August. This amount of rainfall was adequate for the kharif crops. With the result that none of the kharif crops except rice broad cast, sugarcane, and vegetables was irrigated. Rice broad cast is sown in late April or in early May usually and needs irrigation in the last week of May and in early June before commencement of the monsoon rains.

Table XII (page 84) will reveal that there was no rainfall in the month of November and December and it will be seen from a comparison of Figs. 63 and 66 that almost all the rabi crops except pulses (Arhar) and gram were irrigated. Crops like pulses and gram entirely depended upon rainfall.

Land Utilization

The land use of the village in 1960-61 is shown in Figs. 64 to 67.[1] The following Table will give a summary of proportion of the village lands devoted to various uses in 1960-61.

Table XXXXI

Total area of the village--283.70 acres

Use of land	Area in acres	Percentage of total area
Cultivated land	220.90	77.86
Groves[2]	38.49	13.57
Wasteland	6.78	2.39
Settlement	9.49	3.35
Road	3.51	1.24
Grave yard	0.15	0.05
Pond	2.18	0.76
Irrigation channels	2.20	0.78
Total	283.70	100.00

(1) The base map of the village showing the fields and their areas

Contd..2

Table XXXXI shows that nearly 78 per cent of the total land of the village is cultivated, 14 per cent of the total area is under groves and gardens, 6 per cent is under non-agricultural uses consisting of land occupied by settlement, road, ponds, and irrigation channels, while 2 per cent land is unproductive and is not utilized.

The following Table shows the different sizes of the plots in the village in the year 1960-61.

Table XXXXXII

Size of the Plots	Number of plots of each size	Percentage of the plots of each size to the total number of plots
Below 0.50 acre	115	32.9
0.50 acre to 1.0 acre	151	43.1
1.0 to 2.0 acres	74	21.1
over 2.0 acres	10	2.9
Total	350	100.00

It will be seen from the above Table that about 75 per cent of the total number of plots will below 1.0 acre

---

Footnote contd.
was obtained from the Lekhpal of the village concerned. The village was visited by the Writer in the kharif season of 1960 and in the rabi season of 1961 and the use to which each field was being put was recorded on the base map and from the collected data Figs.64-67 were prepared.

(2) The groves in the village consist of fruit as well as non-fruit trees. The principal fruit trees are mango and mahua(Bassia latifolia). Besides these trees guava and lemom gardens also exist in the village. The non fruit trees like nim(melia azadirachta) and pipal (bo-tree) ffrom important florastic species.

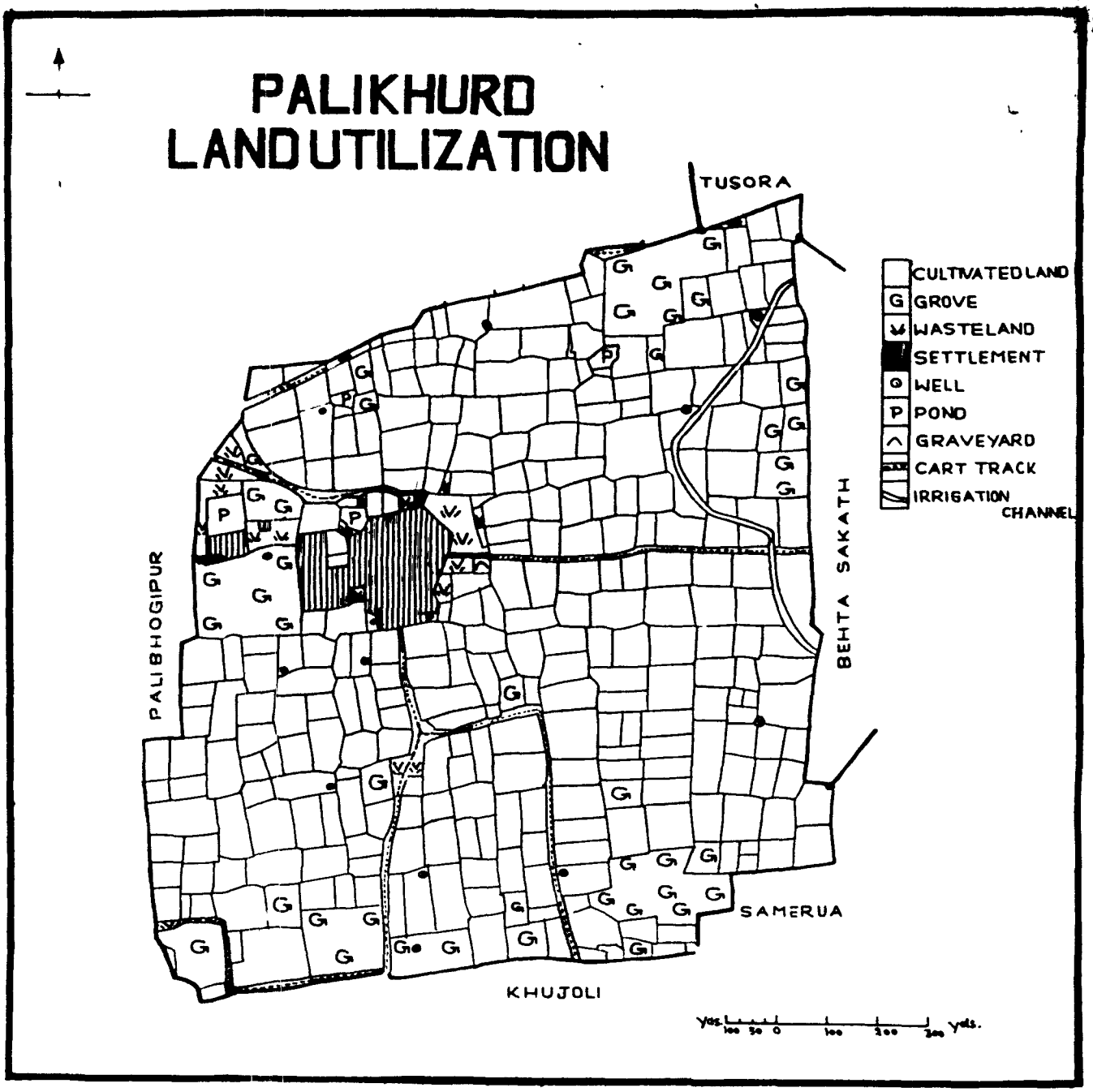

PALIKHURD
LAND UTILIZATION
TUSORA
PALIBHOGIPUR
BEHTA SAKATH
SAMERUA
KHUJOLI
CULTIVATED LAND
GROVE
WASTELAND
SETTLEMENT
WELL
POND
GRAVEYARD
CART TRACK
IRRIGATION CHANNEL
Yds. 100 50 0 100 200 300 Yds.

Fig. 64

in size. Of the total, one third were below 0.50 acre. 21 per cent of the total number of plots were between 1 and 2 acres while only 10 plots over 2 acres in area were found here and there.

A comparison of Figs. 62 and 64 shows a close relationship between quality of land and the size of the fields. The fields of the good quality lands (A) are mostly small in size, while the fields of the medium quality lands (B) are relatively large.

Land Utilization in Kharif Season

The use of land in the kharif season of 1960 is mapped in Fig. 65. The following Table will show the crop distribution in the village.

Table XXXXIII

Gross cultivated area 220.90 acres
Net cropped area in the kharif season 123.26 acres

Crops	Area in acres	Percentage of gross cultivated land	Percentage of net cropped land	Total percentage of gross cultivated land	Total percentage of net cropped land
GRAIN CROPS:-				43.14	77.32
Millets & pulses	56.93	25.77	46.19		
Rice(Broadcost)	20.35	9.21	16.51		
Big millet	14.25	6.45	11.56		
Small millet	0.81	0.36	0.66		
Pulses	1.99	0.90	1.61		
Maize	0.99	0.45	0.80		
OTHER CROPS:-				12.66	22.68
Sugarcane	13.83	6.26	11.22		
Sweetpotato	1.69	0.77	1.37		
Vegetables	0.68	0.31	0.56		
Sanhemp	0.25	0.11	0.20		
Fodder	11.49	5.21	9.33		
Fallow	97.64	44.20	..	44.20	
Total	220.90	100.00	100.00	100.00	100.00

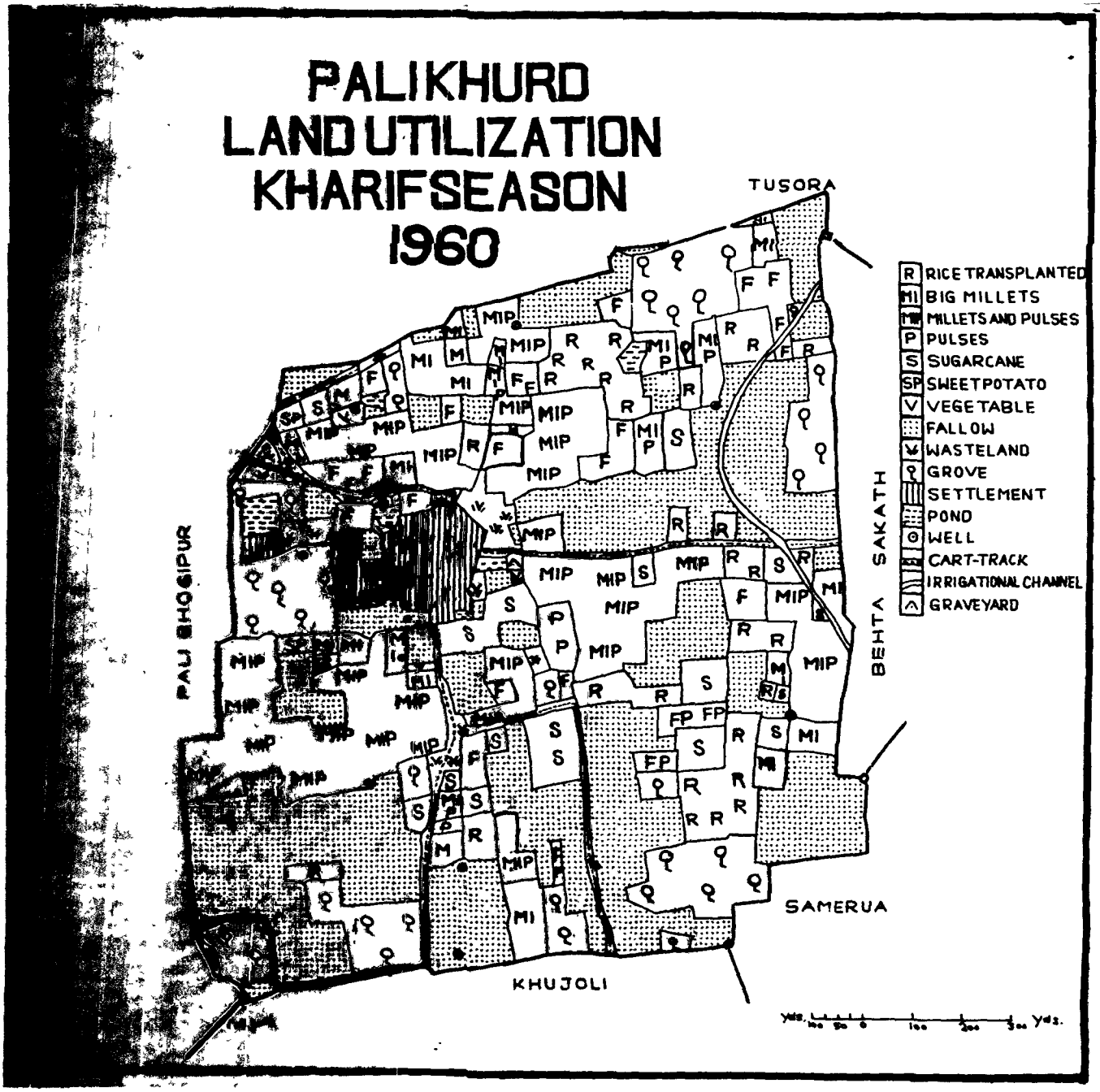

PALIKHURD
LAND UTILIZATION
KHARIF SEASON
1960
TUSORA
PALI BHOGIPUR
BEHTA SAKATH
SAMERUA
KHUJOLI
R RICE TRANSPLANTED
MI BIG MILLETS
MIP MILLETS AND PULSES
P PULSES
S SUGARCANE
SP SWEETPOTATO
V VEGETABLE
F FALLOW
W WASTELAND
GROVE
SETTLEMENT
POND
WELL
CART-TRACK
IRRIGATIONAL CHANNEL
GRAVEYARD

Fig. 65

It will be seen from Table XXXXIII that grain crops occupy nearly eight -tenths of the net cropped land in the kharif season. Millets mixed with pulses is the major crop and occupies nearly half of the net cultivated area. The importance of mixed crops among the kharif crops is mainly due to the nature of the soil of the village. The light sandy calyey loam fields in the southern and especially south-western parts of the mapped area are devoted to millets and pulses because this high lying part lies close to the river Pando and admixture of the sand in the clayey loam soil is noteworthy in the part of the village. Rice broadcast covers one-sixth of the low-lying area of the clayey loam soil while high lying fields are devoted to sugarcane in the north andmiddle part of the village. Sugarcane occupies more than one tenth of the net cropped area in the kharif season. Sugarcane is a cash crop for the villagers. Gur is prepared in the village and one-fifth of its produce is sold in the markets of Narwal and Palikalan. Millets and fodder together occupy about 21 per cent of the net cropped land. The area under vegetables and sweet potatoes is negligible.

44.20 per cent of the gross cultivated area is left fallow in the kharif season as these lands are capable of producing only one crop a year.

A comparison of Figs. 62 and 65 shows a close influence of soil on the crop pattern. Rice broadcast and

sugarcane mostly cover the good quality lands(A). Big millet either as a grain or as a fodder sown as a sole crop occupies the good quality land. On the medium quality lands millets and pulses are grown.

Land Utilization in the Rabi Season

The use of land in the rabi season of 1960-61 is illustrated in Fig. 66. The area occupied by each crop in the Rabi season is shown below.

Table XXXXIV

Gross cultivated area 220-90 acres
Net cropped land in the rabi season 140.46 acres

Crops	Area in acres	Percentage of gross cultivated land	Percentage of net cropped land	Total percentage of gross cultivated land	Total percentage of net cropped land
GRAIN CROPS:				62.39	98.11
Wheat	55.71	25.22	39.66		
Barley & Gram	30.19	13.67	21.49		
Gram	27.09	12.26	19.29		
Bajra	12.08	5.47	8.60		
Wheat & Barley	8.64	3.91	6.15		
Wheat & Gram	4.10	1.86	2.92		
OTHER CROPS:-				1.20	1.89
Potatoes	1.12	0.51	0.80		
Vegetables	1.07	0.49	0.76		
Oil seeds	0.46	0.20	0.33		
Continual Kharif crops	70.76	32.03	..	32.03	
Fallow	9.68	4.38	..	4.38	
Total	220.90	100.00	100.00	100.00	100.00

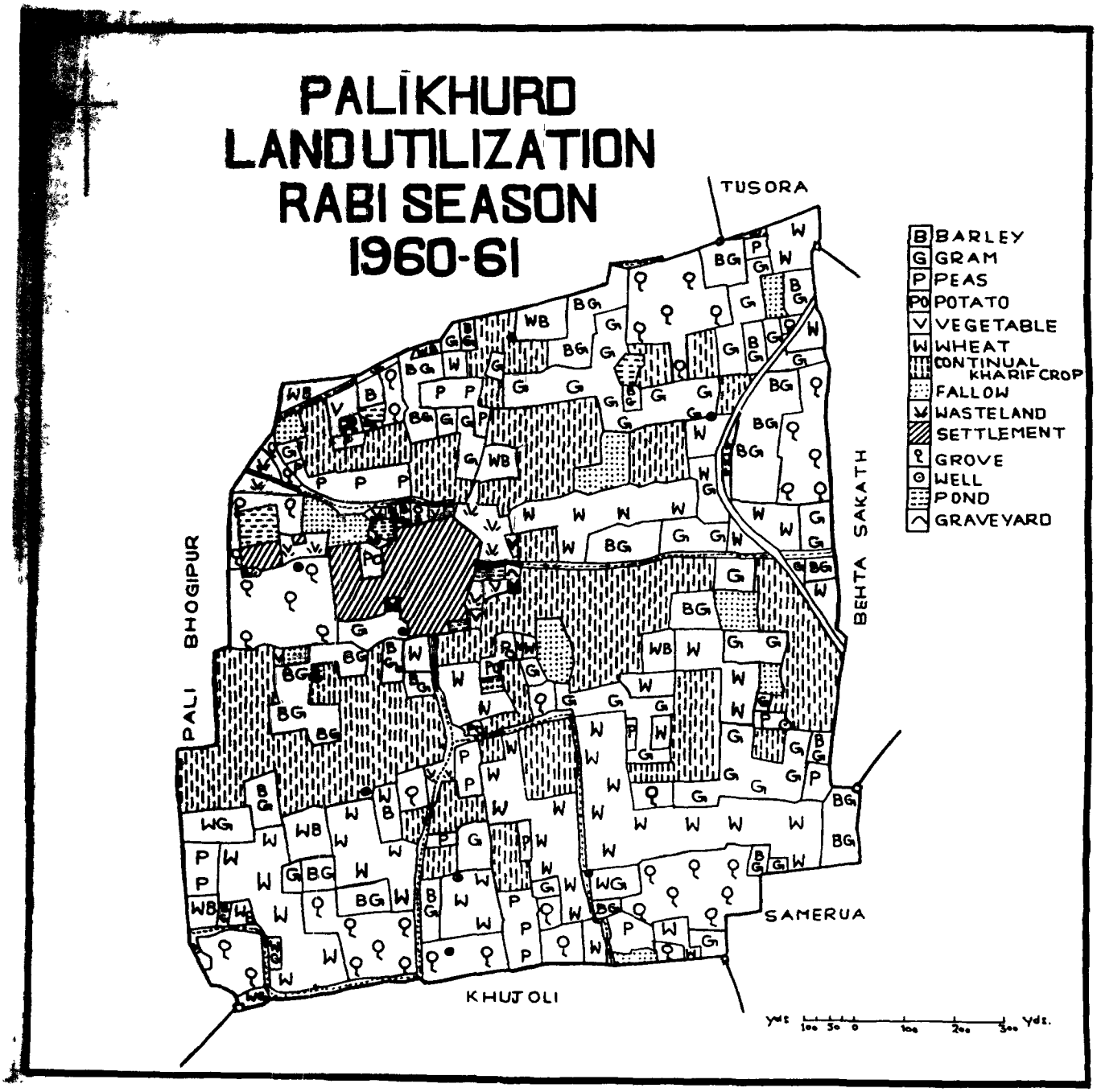

PALIKHURD
LAND UTILIZATION
RABI SEASON
1960-61
TUSORA
BEHTA SAKATH
PALI BHOGIPUR
SAMERUA
KHUJOLI
BARLEY
GRAM
PEAS
POTATO
VEGETABLE
WHEAT
CONTINUAL KHARIF CROP
FALLOW
WASTELAND
SETTLEMENT
GROVE
WELL
POND
GRAVEYARD
Yds. 100 50 0 100 200 300 Yds.

Fig. 66

It will be seen from Table XXXXIV that grain crops occupy nearly 98 per cent of the net cropped land in the rabi season. Wheat is the principal crop and occupies two-thirds of the net cropped land, while barley mixed with gram and gram as a single crop cover another 21 and 19 per cent respectively. The areas under potatoes and vegetables is negligible. The net cropped area during rabi season has been reduced due to continual kharif crops of millet and pulses and sugarcane. Only 4.38 per cent of the gross cultivated land was left fallow in the rabi season which was being prepared for the sowing of sugarcane in the month of March.[1]

Double Cropped Land

The total of the land cropped twice in the year was 42.86 acres or about 19.30 per cent of the gross cultivated land. A comparison of Figs. 62 and 67 will show that double cropped area is restricted mainly to the good quality lands. Some of the good quality lands are devoted to the rice broadcast in the kharif followed by either gram or wheat in the rabi season. The double cropped area is restricted by the cultivation of sugarcane, which occupies the fields of the good quality lands also throughout the year. The medium quality lands consist of light soil and do not produce a second crop in the rabi season. The soil does not yield two crops a year without supply of adequate manures and good facility of irrigation.

(1) The Writer has been able to know from the farmers of the village that the plots prepared for sugarcane are known as padra.

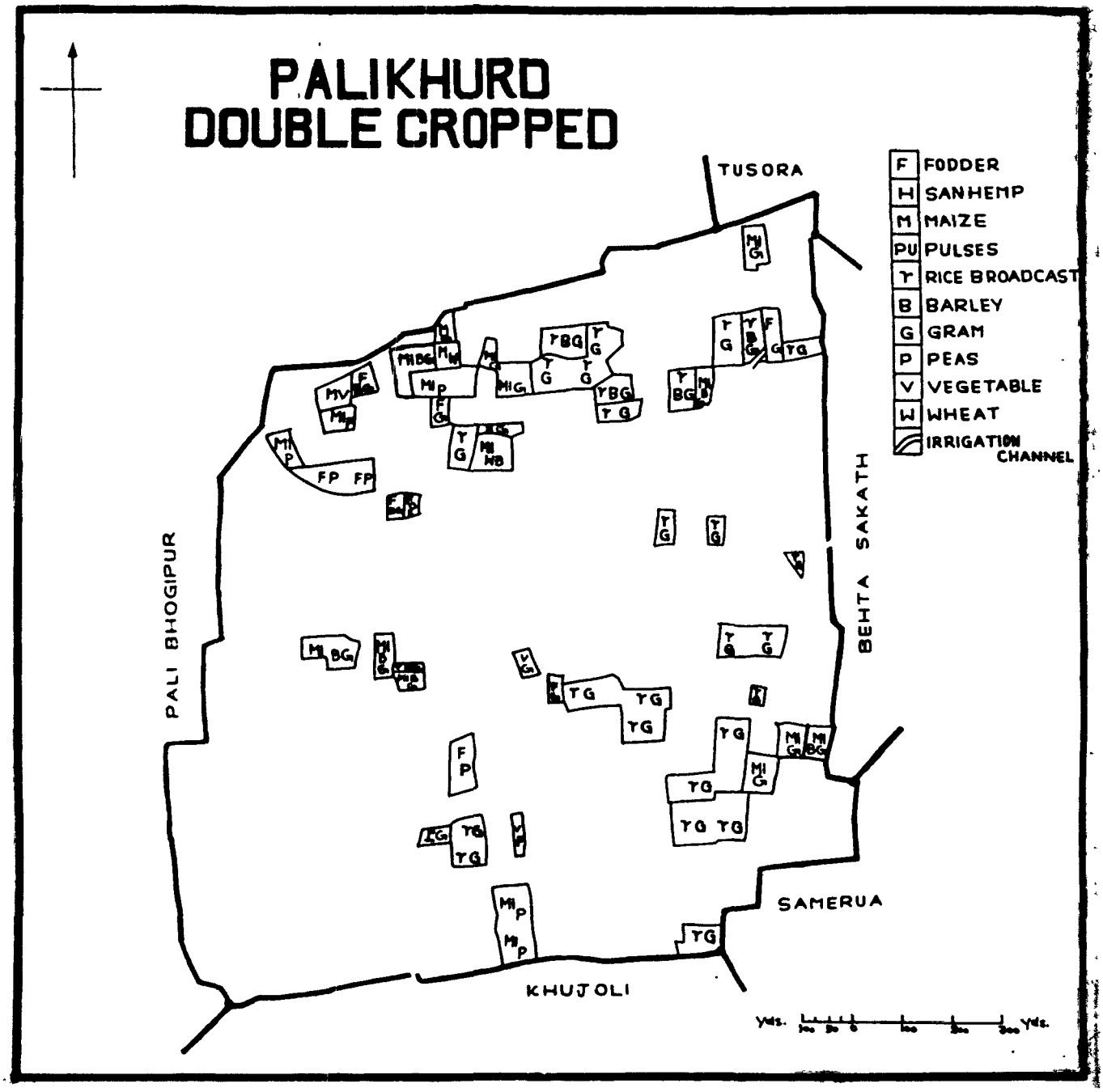

PALIKHURD
DOUBLE CROPPED
TUSORA
PALI BHOGIPUR
BEHTA SAKATH
SAMERUA
KHUJOLI
F FODDER
H SANHEMP
M MAIZE
PU PULSES
R RICE BROADCAST
B BARLEY
G GRAM
P PEAS
V VEGETABLE
W WHEAT
IRRIGATION CHANNEL
Yds.
Yds.

Fig. 67

Land use and Population

Table XXXXV shows the totals of various classes of land as well as the per capita share of the villagers in these lands.

Table XXXXV

Total population actually depending upon the produce of the village = 384 [1]

	Total area of the village	Total available land for cultivation	Net cropped land in the kharif season	Net cropped land in the rabi season	Total cultivated land(both of Kharif and rabi)	Double cropped land
Area in acres	283.70	220.90	123.26	140.46	263.72	42.86
Land per head of population	0.74	0.58	0.32	0.37	0.69	0.11

It will be seen from the above Table that per capita land available for cultivation in the village comes up to 0.58 acre. In the kharif and rabi seasons the per capita land is reduced to 0.32 and 0.37 acre respectively. In the kharif season the reduction in per capita is due to the practice of fallowing, while in the rabi season some arable land remains occupied by kharif crops

(1) Total pupulation of the village = 424
No of persons of the village depending upon the produce of the vill
=85
No of persons of Palikhurd depending upon the produce of other vill
=125
Thus actual No of dependants is (424+85-125)=384.

of millets and pulses and sugarcane.

Table XXXXV further reveals that the per capita double cropped land is 0.11 acre. Thus, the land supporting 1 person in the village of Palikhurd is 0.69 acre, which is lower than that of the other villages. It is remarkable that 60 per cent of the totah population is of the primary rural group and directly depends upon the lands while 40 per cent of the population consists of secondary rural group , who are indirectly dependent upon the land.

The standard of the people in palikhurd is lower than that of the village of khondhan. The pressure of the population on land is high and the scope of the culturable land is limited in the village. The following Table will show the relative productive capacity of the various types of land in the village.

Table XXXXVI

Average yield per acre of good farm land --980 lb.=1P.P.U.

Types of land	Area in acres	Average yield in lb. per acre	Productivity rating per acre	Number of P.P.U.
Good quality lands(A)	56.60	1740	1.77	100.34
Medium quality lands(B)	164.21	980	1	164.21
Poor quality lands (C)	6.78	..	..	....
Total	227.68	...	...	264.55

It will be seen from Table XXXXVI that 227.68 acres of culturable land of palikhurd give a total of 265.P.P.U. The scope for increasing of P.P.U. lies mainly in the conversion of some medium quality land into the good quality land and by increasing the potential productive capacity of the village.

LAND UTILIZATION IN SARUPPUR

Location

The village of Saruppur, comprising an area of 316 acres, lies in the Akbarpur tahsil of Kanpur district, and is situated in $26^{0}22'$N latitude and $79^{0}59'$E longitude. Located in an illdrained plain of the central lowlands, it is bounded by the villages of Banar Alipur in the north and west, Bara in the north-east, Zainpur in the east and Nagin Jasi in the south.

The village forms a very small part of the central lowlands, which lie between the Ganga uplands and the Yamuna-Sengar tract. The village on the whole is a level plain except the portions occupied by swampy depressions. The drainage of the village is poor and throughout the rainy season presents an appearance of continued waterlogging, occasionally covering half of the area in

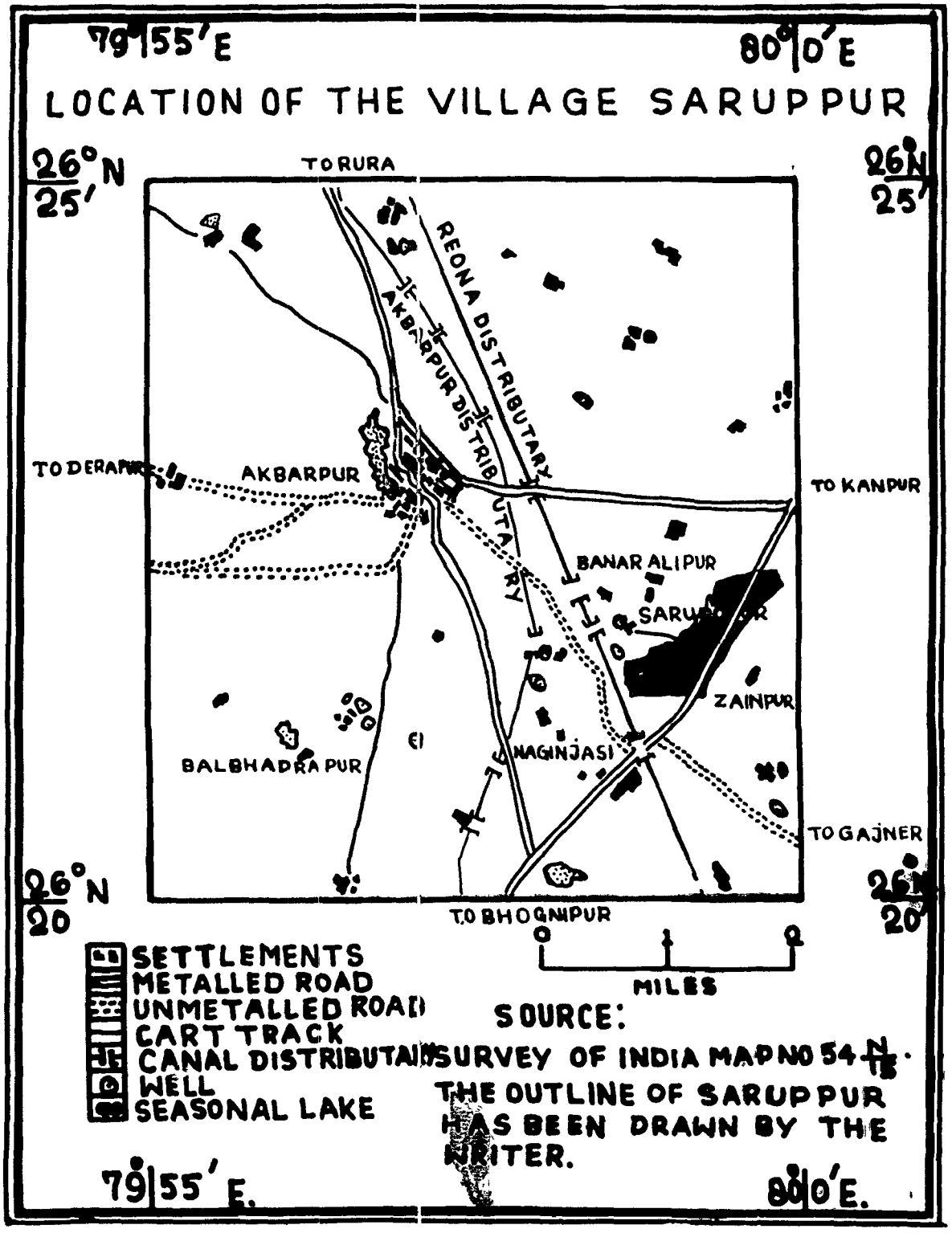

79°55'E
80°0'E
LOCATION OF THE VILLAGE SARUPPUR
26°25'N
TO RURA
REONA DISTRIBUTARY
AKBARPUR DISTRIBUTARY
TO DERAPUR
AKBARPUR
TO KANPUR
BANAR ALIPUR
SARUPPUR
ZAINPUR
BALBHADRAPUR
NAGINJASI
TO GAJNER
26°20'N
TO BHOGNIPUR
0
1
0
MILES
SETTLEMENTS
METALLED ROAD
UNMETALLED ROAD
CART TRACK
CANAL DISTRIBUTARY
WELL
SEASONAL LAKE
SOURCE:
SURVEY OF INDIA MAP NO 54 N/15.
THE OUTLINE OF SARUPPUR HAS BEEN DRAWN BY THE WRITER.
79°55'E.
80°0'E.

Fig. 68

in the south-west of the village. The natural drainage lines are inadequate, the over-flow of a little swampy area finds its way by the artificial drain which has been recently excavated. It drains the surplus water of the middle and eastern part of the village into the canal. Thus there being no sufficient outlet for water except evaporation, dissolved salts accumulate and the saline efflorescence appears on the surface during the dry months.

The village is accessible by the cart-track running through the heart of the village which joins the metalled road in the east and unmetalled road in the west (vide Fig.68). The metalled road(Kanpur-Kalpi road) leads to the city of Kanpur about 25 miles towards the north-east, while unmetalled road terminates at Akbarpur at a distance of 3 miles north-west of the village. The latter ultimately joins Kanpur-Kalpi road near the village of Jasi in the south. Bara, lying at a distance of 4 miles north-east of the village, is the main roadways Station. Saruppur is, therefore, connected with the markets of Akbarpur and Bara as well as with the city of Kanpur.

Climate

No climatic data are recorded in the village. The nearest rainfall recording station from the village is the headquarters of tahsil Akbarpur, which is situated at a distance of about 3 miles to the north-west of Saruppur. The data of rainfall, therefore, recorded at Akbarpur are indicative of the climatic conditions of the

village and have been given in the following Tables XXXXVII and XXXXVIII.[1]

Table XXXXVII

Kharif Season 1960-(Akbarpur)

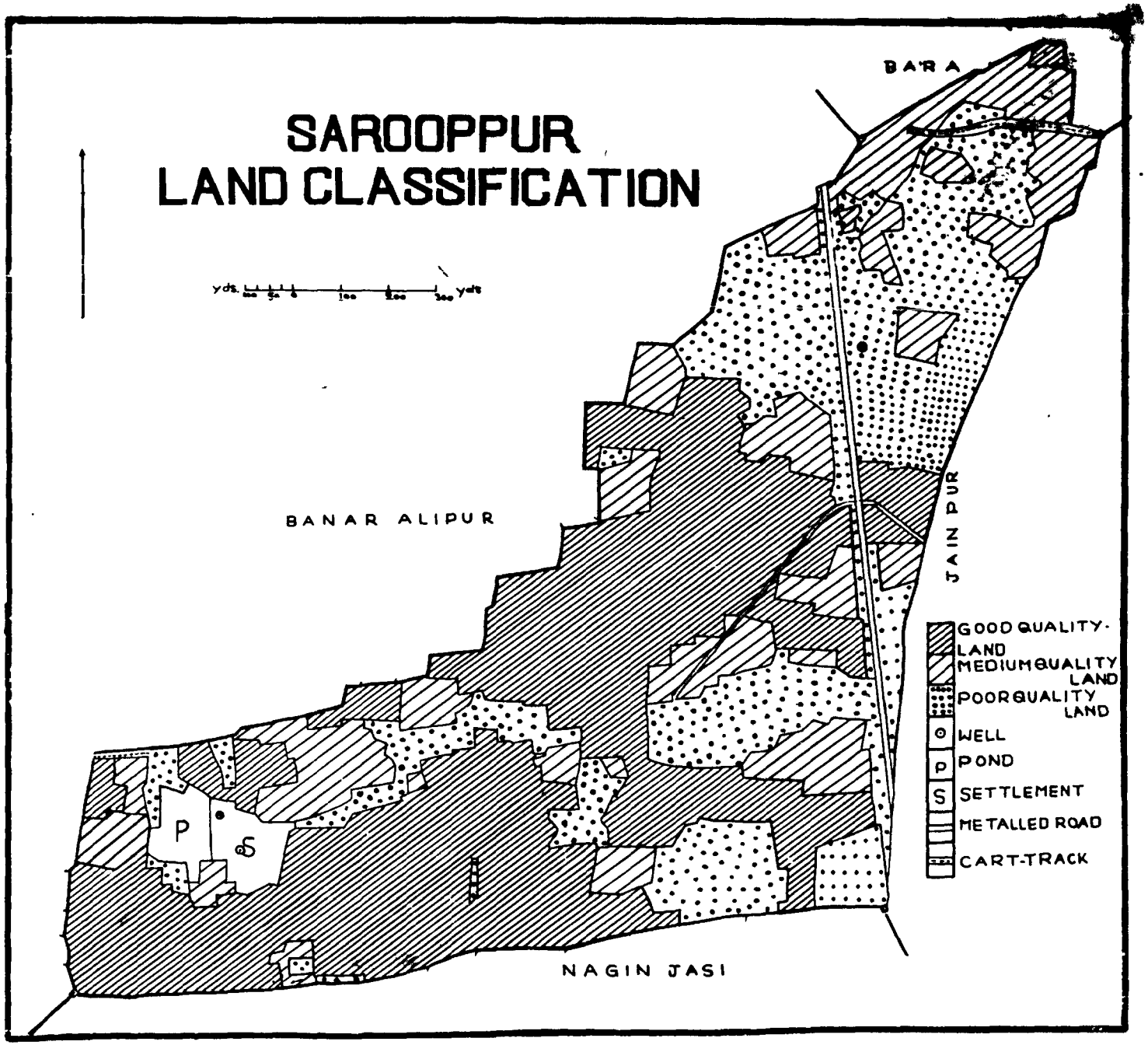
	MONTHS					
	June	July	August	September	October	Total
Rainfall in inches in the kharif season, 1960	0.35	9.16	12.71	2.89	8.27	33.37
Rainy days in kharif, 1960	5	17	19	7	5	53
Average rainfall in inches	2.63	8.49	9.48	5.60	0.92	27.12

Table XXXXVIII

Rabi Season (1960-61) (Akbarpur)

	MONTHS					
	November	December	January	February	March	Total
Rainfall in inches in the rabi season 1960-61	...	...	1.94	1.26	...	3.20
Rainy days in the rabi season	...	...	5	4	...	9
Average rainfall in inches	0.03	0.18	0.68	0.48	0.36	1.73

(1) The data of rainfall for the kharif and rabi seasons of 1960-61 were obtained from the headquarters of the district Kanpur.


SAROOPPUR
LAND CLASSIFICATION
yds.
yds
BARA
BANAR ALIPUR
JAIN PUR
NAGIN JASI
P
S
GOOD QUALITY LAND
MEDIUM QUALITY LAND
POOR QUALITY LAND
WELL
POND
SETTLEMENT
METALLED ROAD
CART-TRACK

Land Classification

The soil of the area in which the village is situated is mainly clayey (Fig. 25) on the basis of fertility and productivity, (See page.57.) the village fields have been classified and differentiated in Fig. 69. The soil of the good quality land (A) is loamy clay and is used either for raising two crops a year or is devoted to sugarcane. of the medium quality lands, the soil of (B) consists of clay and is less productive than 'A'. The 'B' lands are left fallow in the kharif season or, are either given to millets mixed with pulses or devoted to transplanted rice.

The soil of the poor quality land (C) is rendered unproductive due to the presence of a high proportion of injurious salts at or near the surface.

Irrigation

Irrigation in the village is carried on mainly by irrigation channels from the Reona distributary of Etawah branch of the Lower Ganga Canal. The area irrigated in the kharif and rabi season during the year 1960-61 is shown in Fig. 70. Irrigation from wells and ponds is insignificant. It will be seen from Table XXXXVII that the total rainfall in the kharif season in the year 1960 was about 34 inches and was spread over sufficient number of days in the months of July, August, September, and October. This amount of rainfall was adequate for a good number of kharif crops. But sugarcane,

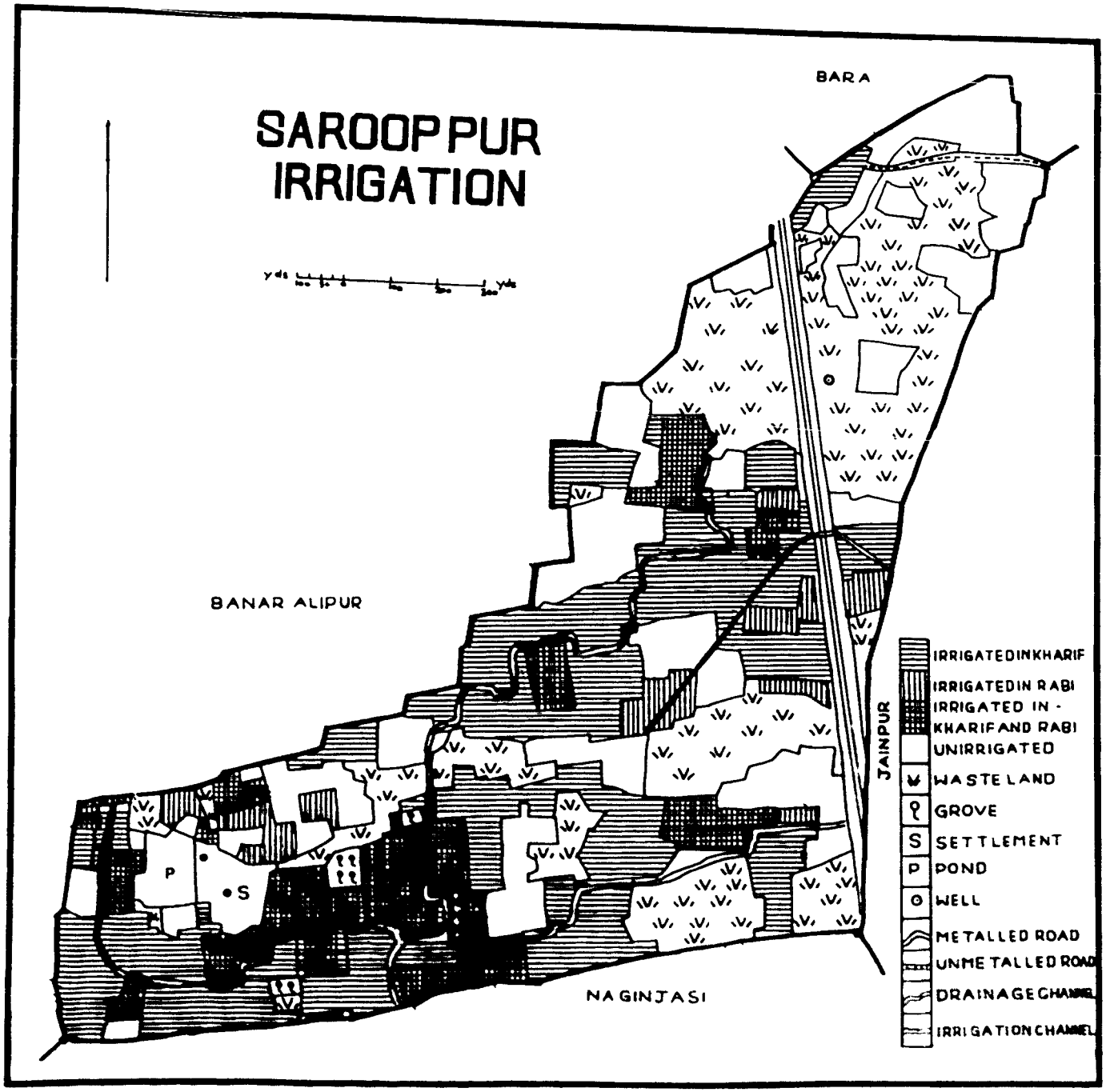

SAROOP PUR
IRRIGATION
BARA
BANAR ALIPUR
NAGINJASI
JAINPUR
P
S
IRRIGATEDINKHARIF
IRRIGATEDIN RABI
IRRIGATED IN -
KHARIF AND RABI
UNIRRIGATED
WASTE LAND
GROVE
SETTLEMENT
POND
WELL
METALLED ROAD
UNMETALLED ROAD
DRAINAGE CHANNEL
IRRIGATION CHANNEL

Fig. 70

broadcast rice and millets sown as fodder crops, which were sown in the month of May, needed irrigation. Table XXXXVIII indicates that there was no rainfall in t.e months of November and December but the amount of rainfall in the months of January and February was sufficient, with the result a few crops like wheat, peas and potatoes were irrigated in the month of December. The fields of transplanted rice are dependent upon rainfall. But at a time of deficiency of rainfall, these fields also require irrigation. A comparison of Figs. 69 and 70 indicates that usually good quality lands which yield two crops a year are irrigated both in kharif and rabi seasons and their fertility depends upon the irrigation facilities. As the drainage system is defective, irrigation should be carried on by canals with caution since salanity may increase, resulting an addition of usar lands.

Land Utilization

The land use of the village in 1960-61 is shown in Figs. 71 to 74 which are based on the Writer's field work of the village.[1] The following Table will show the various forms of land use in 1960-61.

Table IXL

Total area of the village =316.13 acres

Use of land	Area in acres	Percentage of the total area
Cultivated land	208.49	65.95
Waste land	84.53	26.74
Groves	1.84	0.58
Settlement	4.12	1.30
Road	13 .11	4.15
Pond	3.27	1.04
Natural water features(Nala)	0.77	0.24
Total	316.13	100.00

(1) The base map showing the fields and their areas in acres was obtained from the Lekhpal of the village concerned. The village was visited

Contd..2

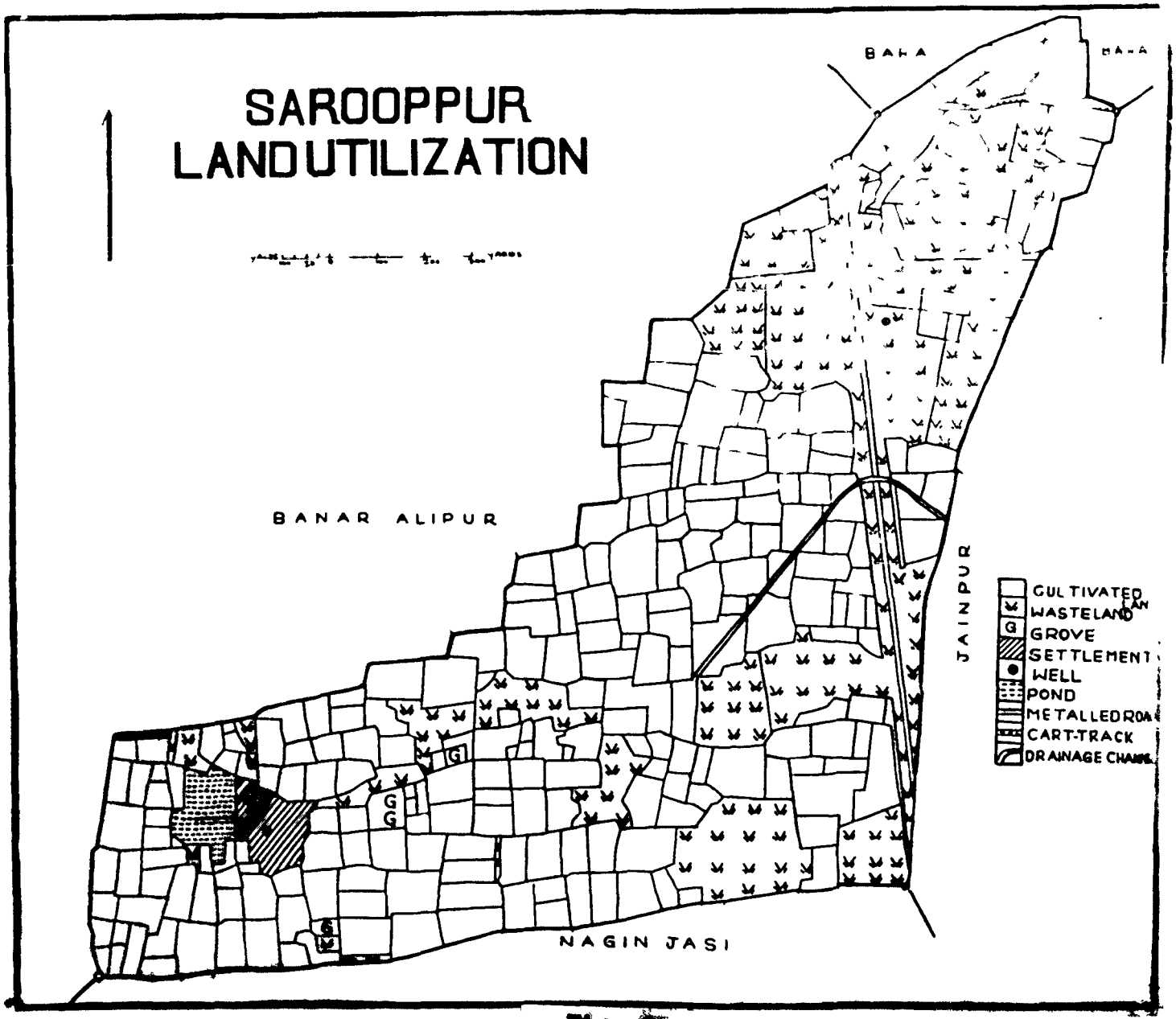

SAROOPPUR
LANDUTILIZATION
BAHA
BAHA
BANAR ALIPUR
JAINPUR
NAGIN JASI
CULTIVATED
WASTELAND
GROVE
SETTLEMENT
WELL
POND
METALLED ROA
CART-TRACK
DRAINAGE CHANN

Fig. 71

Table IXL shows that 66 percent of the total land of the village is cultivated. The scattered patches of cultivation in this village are also badly infected with kans and other noxious grasses. About 7 percent is devoted to non agricultural uses while 27 per cent is usar and unproductive. Usar lands stretch as a continous belt along the north-eastern and south-eastern fringe of the village. Reh appearing as a white crust on the soil is the most important characteristic of usarland. The problem of utilizing land of this sort is extremely complex. Dhak (Butea-frondosa) survives well on usar lands and grows freely. But the patches of dhak have been cleared off by the villagers due to scarcity of fuel. A comparative study of Figs. 69 and 71 indicates that there is close relationship between the quality of land and the size of the fields. The fields of good quality lands are mostly small in size while the fields of the poor quality lands are very large. Table L gives an idea of the different sizes of the plots in Saruppur in 1960-61.

Table L

Size of plots	Number of plots of each size	Percentage of plots of each size to the total No. of Plots
Below 0.50 acres	89	29.2
0.50 to 1.0 acre	108	35.4
1.0 to 2.0 acres	81	26.6
2.0 to 3.0 acres	14	4.6
over 3.0 acres	13	4.2
Total	305	100.00

Contd.. by the Writer in the kharif season of 1960 and in the rabi season of 1961, and the use to which each field was being put was recorded on the base map. From the data Figs. 71 to 74 were prepared.

It will be seen from Table L that 64.6 per cent of the total number of plots are below 1 acre in size, while 2 per cent are between 1 and 2 acres. Only 13 plots are more than 3 acres in size which are usually wastelands and are confined to the north-east and south-east parts of the village. (Fig. 71).

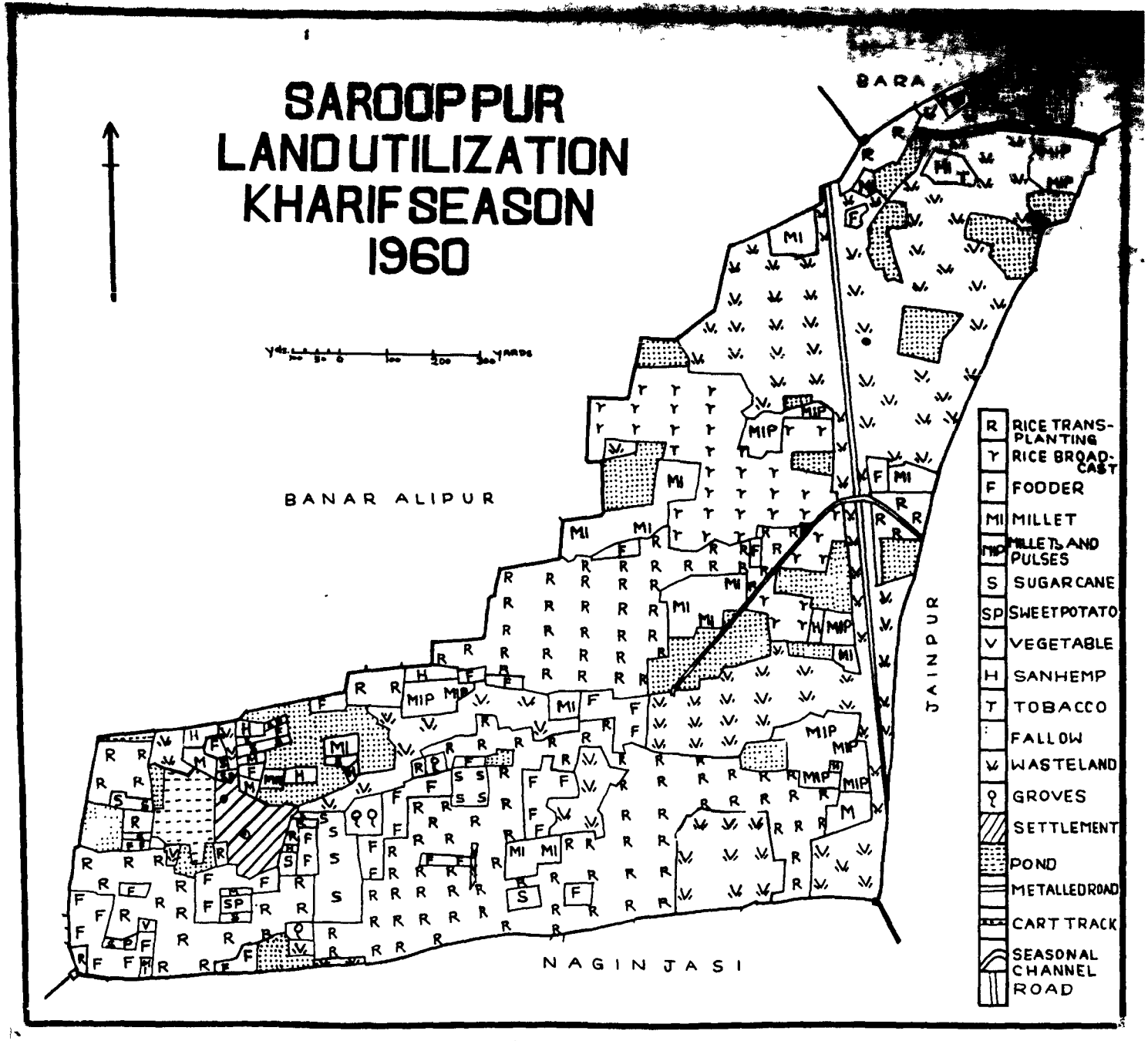
Land Utilisation in Kharif Season

The use of land in the kharif season of 1960 is mapped in Fig. 72. The area occupied by each crop is shown in the following Table.

Table LI

Gross cultivated area 208.49 acres
Net cropped area in the kharif season 171.60 acres

Crops	Area in acres	Percentage of gross cultivated area	Percentage of net cropped area	Total percentage of gross cultivated land	Total percentage of net cultivated land
GRAIN CROPS:-				68.51	83.25
Rice	113.09	54.24	65.90		
Millets	14.43	6.92	8.41		
Millets & Pulses	9.24	4.43	5.39		
Maize	3.19	1.53	1.86		
Bulrush Millet	2.89	1.39	1.69		
OTHER CROPS:-				13.80	16.75
Sugarcane	6.76	3.25	3.94		
Sweet potato	1.42	0.68	0.82		
Fodder	17.58	8.43	10.24		
Sanhemp	2.75	1.32	1.60		
Vegetables	0.25	0.12	0.15		
Fallow	36.89	17.60	..	17.69	..
Total	208.49	100.00	100.00	100.00	100.00


SAROOPPUR
LAND UTILIZATION
KHARIF SEASON
1960
BARA
BANAR ALIPUR
JAINPUR
NAGINJASI
R RICE TRANS-PLANTING
ϒ RICE BROAD-CAST
F FODDER
MI MILLET
MIP MILLETS AND PULSES
S SUGARCANE
SP SWEETPOTATO
V VEGETABLE
H SANHEMP
T TOBACCO
FALLOW
WASTELAND
GROVES
SETTLEMENT
POND
METALLED ROAD
CART TRACK
SEASONAL CHANNEL
ROAD

No. 72

Table LI shows that grain crops occupy more than eight-tenths of the net cultivated land of which rice alone occupies 66 per cent of net cultivated area. Other important crops are fodder, millet, and pulses mixed with millets of these fodder covers one-tenth of net cropped land.

A comparison of Figs. 69 and 72 shows a close influence of soil on the crop pattern. Maize, sugarcane, fodder and broadcast rice cover usually the good quality lands. Transplanted rice finds a place in the lowlying fields in the north-east of the village, where the patches of clayey soil intersersed with usar. 17.69 per cent of gross cultivated area is left fallow in the kharif season for these lands are capable of producing only one crop a year.

Land Utilization in Rabi Season

The use of land in rabi season of 1960-61 is illustrated in Fig. 73. Table LII gives the proportions of the area occupied by each crop in the rabi season and this Table shows that grain crops occupy mainly over 99 per cent of the net cropped land in the rabi season. Barley mixed with gram is by far the most important crop, which is followed by wheat mixed with gram, gram sown as a sole crop and wheat mixed with gram. The area under potatoes is insignificant as the major attention is paid to the food cereals by the villagers.

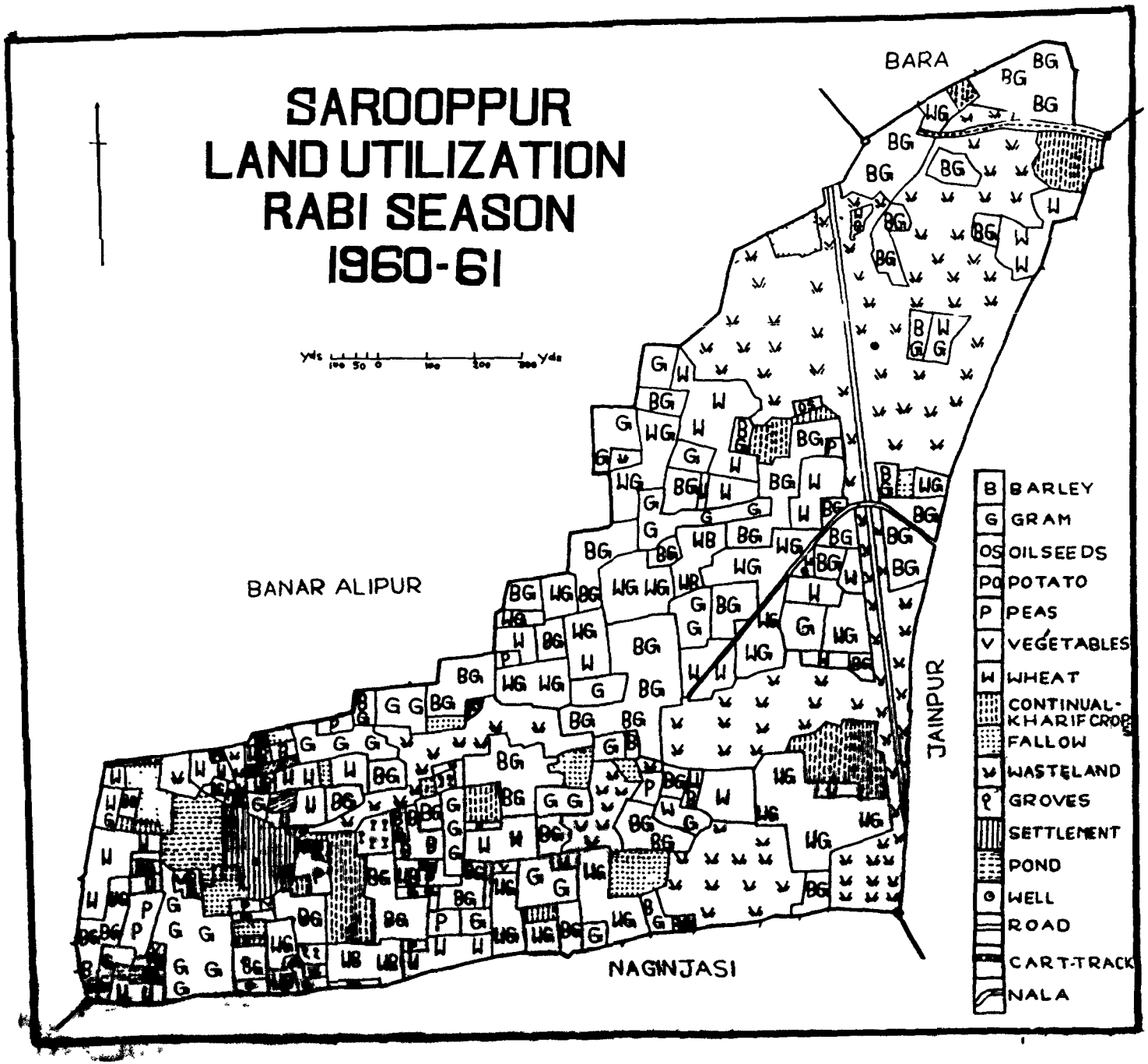

SAROOPPUR
LAND UTILIZATION
RABI SEASON
1960-61
BARA
BANAR ALIPUR
JAINPUR
NAGWJASI
B BARLEY
G GRAM
OS OILSEEDS
PO POTATO
P PEAS
V VEGETABLES
W WHEAT
CONTINUAL-KHARIF CROPS
FALLOW
WASTELAND
GROVES
SETTLEMENT
POND
WELL
ROAD
CART-TRACK
NALA

Fig. 73

Table LII

Gross cultivated area 208.49 acres
Net cropped area in the Rabi Season 179.99 acres

Crops	Area in acres	Percentage of gross cultivated land	Percentage of net cropped land	Total percentage of gross cultivated land	Total percentage of net cropped land
GRAIN CROPS:				85.87	99.47
Wheat	34.97	16.77	19.43		
Barley & Gram	63.28	30.35	35.16		
Wheat & Gram	36.95	17.72	20.53		
Gram	29.16	13.99	16.20		
Wheat & Barley	7.29	3.50	4.05		
Barley	1.82	0.87	1.01		
Peas	5.57	2.67	3.09		
OTHER CROPS:				0.45	0.53
Potato	0.83	0.40	0.46		
Oil seeds	0.12	0.05	0.07		
Continual kharif crops	16.00	7.68	..	7.68	..
Fallow	12.50	6.00	..	6.00	..
Total	208.49	100.00	100.00	100.00	100.00

Double Cropped Land

The double cropped land of the village is depicted in Fig. 74. The total of the area cropped twice in the year was 143.10 acres-or about 68.64 per cent of the gross cultivated land. It will be seen from a comparison of Figs. 69 and 74 that the land cropped twice in the year is confined mainly to the good quality lands, which are provided with the irrigation facilities. Double cropped land

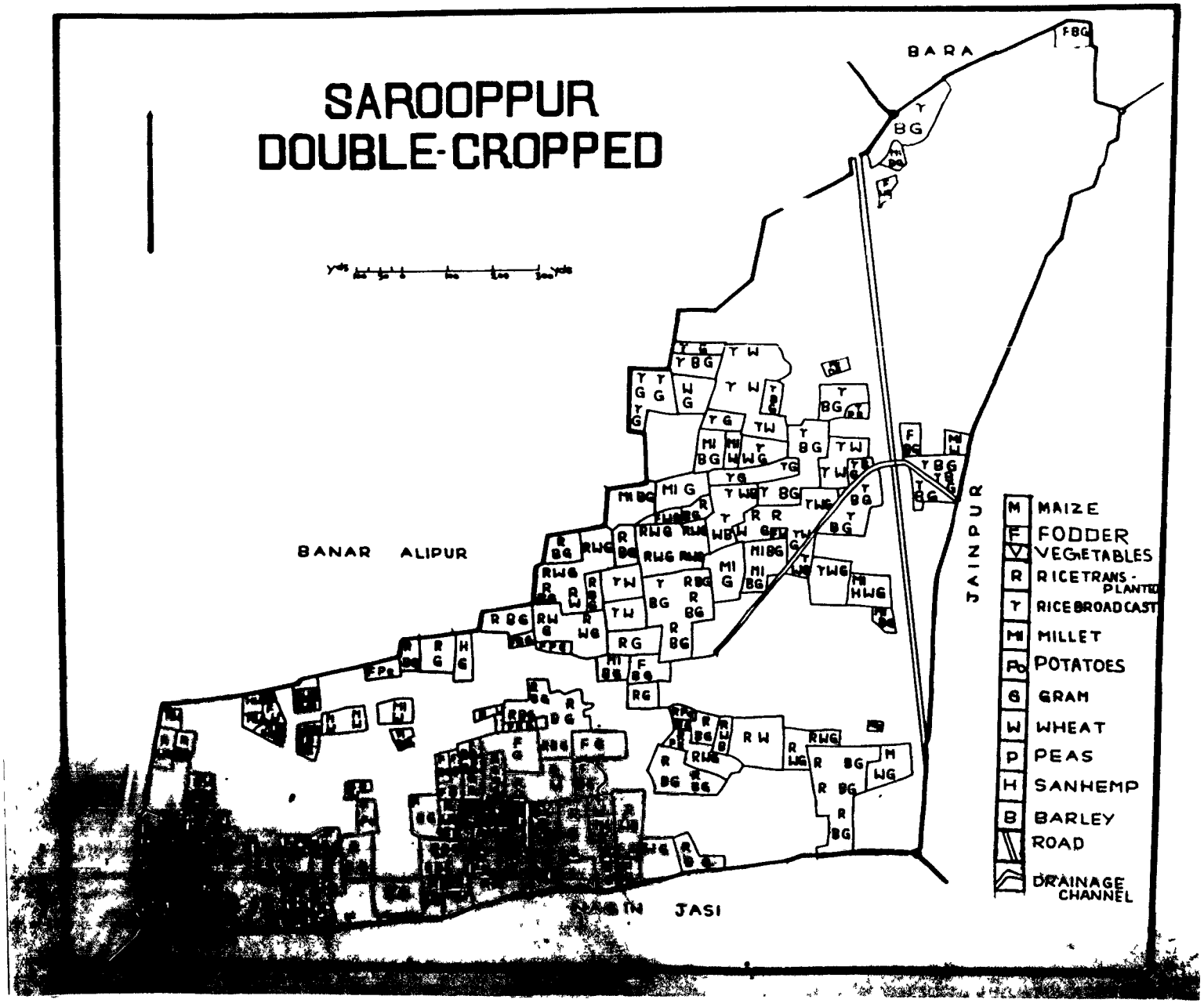

SAROOPPUR
DOUBLE-CROPPED
BARA
BANAR ALIPUR
JAINPUR
JASI
M MAIZE
F FODDER
V VEGETABLES
R RICE TRANS-PLANTED
T RICE BROADCAST
MI MILLET
PO POTATOES
G GRAM
W WHEAT
P PEAS
H SANHEMP
B BARLEY
ROAD
DRAINAGE CHANNEL

Fig. 74

is restricted due to the cultivation of sugarcane. As some of the good quality fields are devoted to sugarcane, which occupies the fields for almost the whole of the year. Double cropped land is further reduced due to the practice of fallowing in the kharif, as the medium quality lands are less productive than A and without adequate manures and irrigation do not yield two crops a year.

Land Use and Population

The following Table shows the total of various categories of lands in the village and the per capita share of the villagers in these lands.

Table LIII

Total Population depending upon the produce of the village....313[1]

	Total area of the village	Total available land for cultivation	Net cropped land in the kharif season	Net cropped land in the rabi season	Total cultivated land both of kharif & rabi	Double cropped
Area(in acres)	316.13	208.49	171.60	179.99	351.59	143.10
Land per head of population	1.01	0.67	0.55	0.57	1.12	0.45

(1) Population data according to 1961 census.

It will be seen from Table LIII that the per capita cultivated land in the village comes up to 0.67 acre only but in the kharif anf rabi seasons the per capita cultivated land is 0.55 and 0.57 acre respectively. Whereas some of the cultivated land in the kharif season is left fallow, in the rabi season the reduction is caused by the continual kharif crops, e.g., sugarcane and pulses, which occupy the lands for whole of the rabi season.

Table LIII further shows that the per capita double cropped land is 0.45 acre and the per capita gross cultivated land is 1.12 acres. It means, in other words that amount of land supporting one person in Saruppur is 1.12 acres.

About 283 persons(84 per cent of the total population) belong to the primary rural group. They exclusively depend upon the land, while 16 per cent of the population is secondary rural and serves the primary rural population and indirectly depends upon land. The standard of living and health of the people is good. The village is self sufficient in its produce. However, the productive capacity of the land can be increased only by reclaiming the wastelands. Table LIV gives the relative productive capacity of the various types of land in the village.

Table LIV

Average yield per acre of good Farm land =

1640 lb. = 1 P.P.U.

Types of land	Area in acres	Average yield in lb. per acre	Productivity rating per acre	Number of P.P.U.
Good quality lands (A)	149.86	2240	1.37	205.30
Medium quality lands(B)	58.63	1640	1.00	58.63
Poor quality lands (C)	84.53	..	..	..
Total	293.02			263.93

It is clear from the above Table that 293.02 acres of cultivable land or Saruppur gives a total of 264 P.P.U. The scope for further addition in P.P.U. lies only in the reclamation of wastelands.

LAND UTILIZATION IN KUNWARPUR

Location

The village of Kunwarpur is situated in $26^{0}15'$N lat., and $80^{0}9'$E long., at a distance of about 9 miles north of the headquarters of Ghatampur tahsil and 24 miles south-west from the headquarters of the district Kanpur. The village comprises an area of 368 acres. Located in the north-eastern extremity of the central lowlands, it is bounded by the villages of Targaon in the north, Tilsara in the east, Tejpur in the south, and Nandana in the west. Though the village lies in an illdrained plain, where numerous small seasonal lakes exist, yet it is located some what on the higher level than that of its neighbouring villages. Therefore, the village is free from water-logging and the soil is also superior to that of the village of Saruppur lying in the west of the same low land tract.

The village is accessible by the : cart track, which runs through the heart of the village and joins the unmetalled

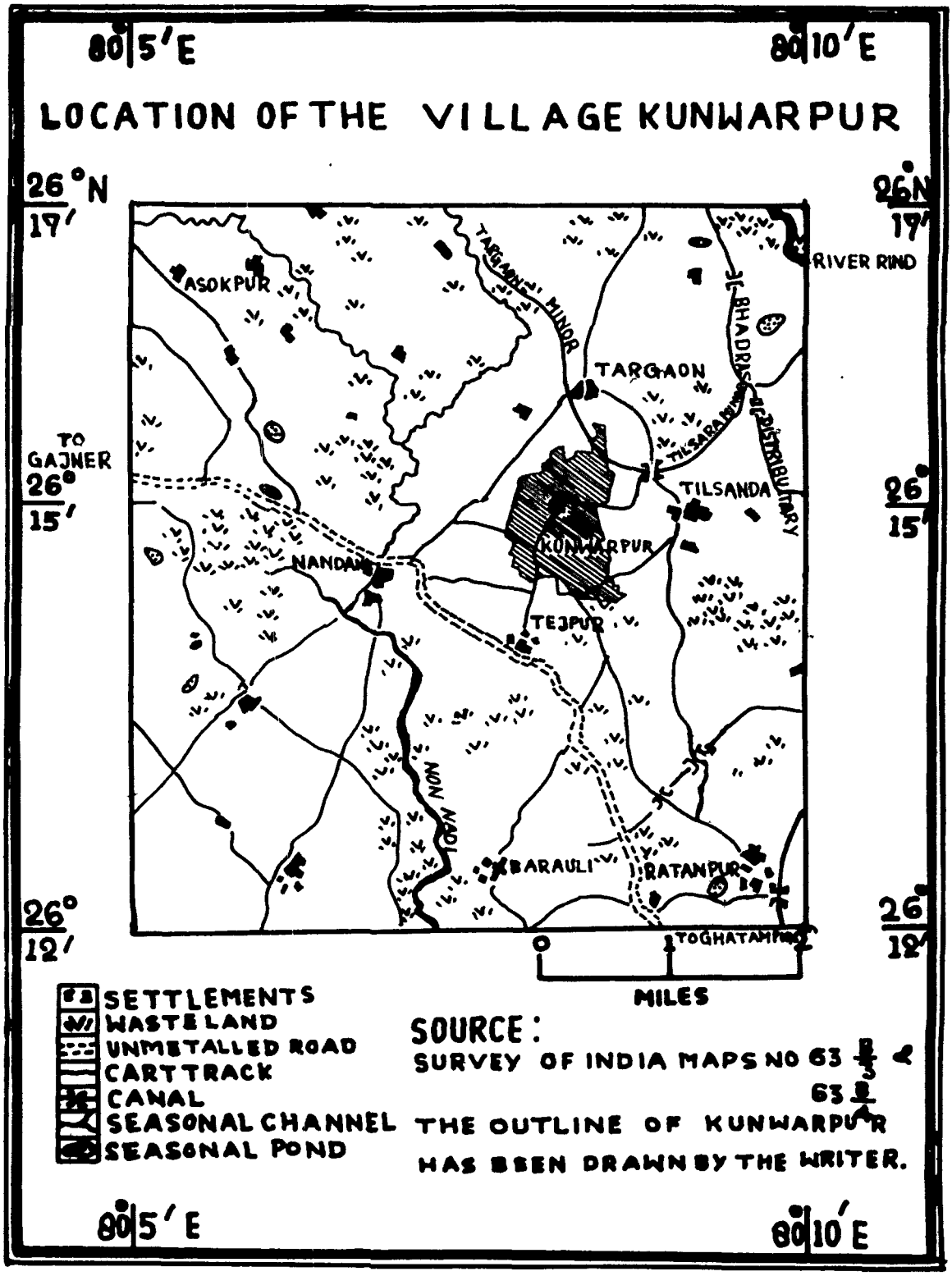

80°5′E
80°10′E
LOCATION OF THE VILLAGE KUNWARPUR
26°N 17′
26°N 17′
TO GAJNER
26° 15′
26° 15′
26° 12′
26° 12′
ASOKPUR
TARGAON MINOR
RIVER RIND
BHADRAS DISTRIBUTARY
TARGAON
TILSABA MINOR
TILSANDA
KUNWARPUR
NANDAN
TEJPUR
NON NADI
BARAULI
RATANPUR
TOGHATAMPUR
0
1
MILES
SETTLEMENTS
WASTE LAND
UNMETALLED ROAD
CART TRACK
CANAL
SEASONAL CHANNEL
SEASONAL POND
SOURCE:
SURVEY OF INDIA MAPS NO 63 B/3 & 63 B/4
THE OUTLINE OF KUNWARPUR HAS BEEN DRAWN BY THE WRITER.
80°5′E
80°10′E

Fig. 75

road leads to the market of Gajner about 6 miles to the north-west of the village and terminates at Ghatampur in the south. The village is also connected by another unmetalled road with Patara, lying on the Kanpur-Hamirpur road at a distance of about 5 miles east of the village.[1] The village is, therefore, connected with the important markets of Gajner Ghatampur and Patara. (Fig.75) . During the wet monsoon months, defective drainage, seasonal lakes and swamps make the communication difficult.

Climate

No climatic data are recorded in the village. The data of rainfall recorded at the headquarters of tahsil Ghatampur about 9 miles to the south of the village have,, therefore, been given in Tables L V and L VI.[2]

Table L V

Kharif Season - 1960(Ghatampur)

	MONTHS					
	June	July	August	September	October	Total
Rainfall in inches in the kharif seasonp, 1960	0.70	17.43	17.50	2.96	7.90	46.49
Rainy days in kharif, 1960	4	16	20	7	7	54
Average rainfall in inches	2.41	9.29	10.71	6.36	1.13	29.90

(1) Patara is also railway station on the Kanpur-Banda loop of the Central Railway.
(2) The rainfall data of kharif and rabi seasons for Ghatampur were obtained from the headquarters of the district Kanpur.

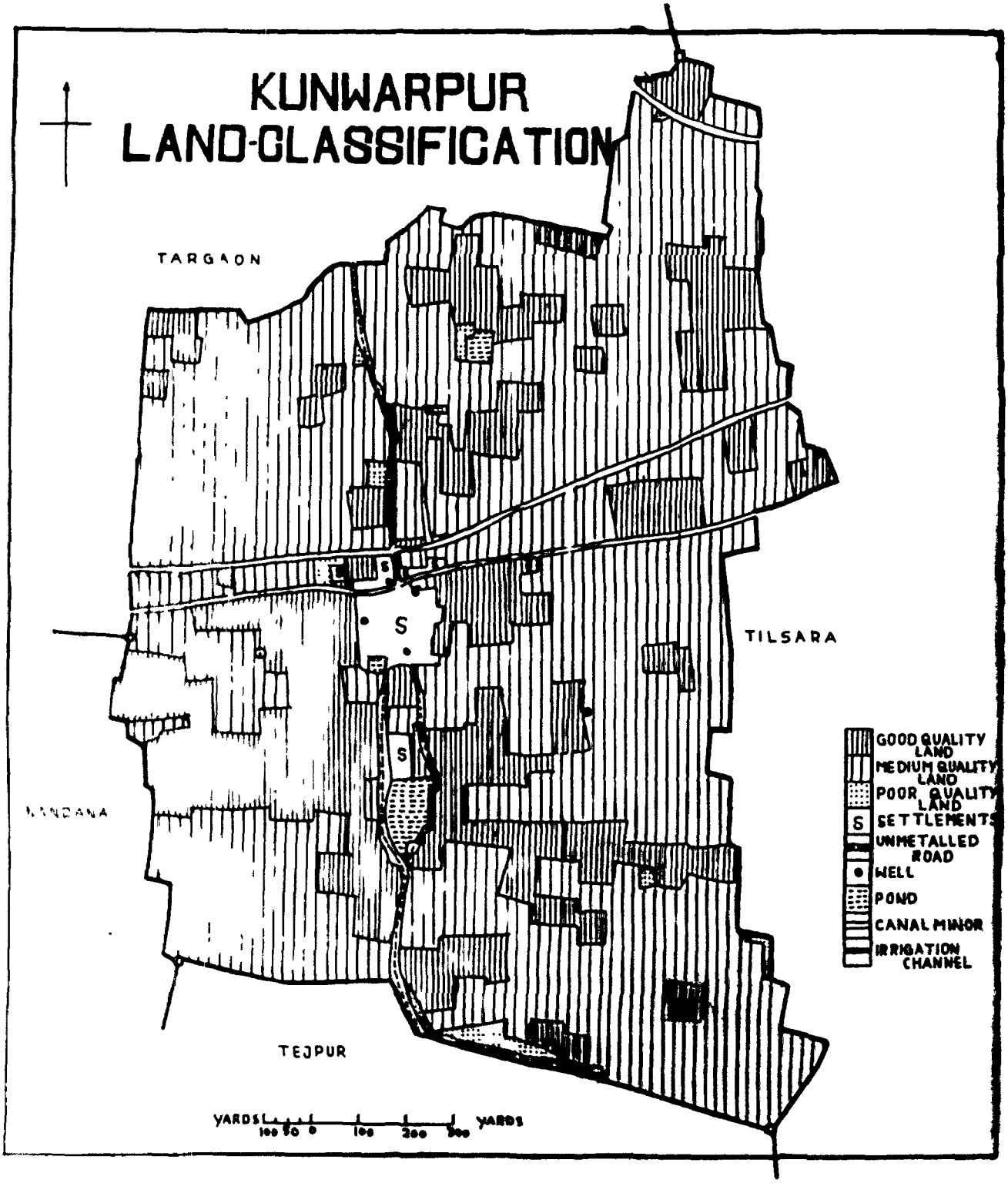

KUNWARPUR
LAND-CLASSIFICATION
TARGAON
TILSARA
TEJPUR
S
S
S
GOOD QUALITY LAND
MEDIUM QUALITY LAND
POOR QUALITY LAND
SETTLEMENTS
UNMETALLED ROAD
WELL
POND
CANAL MINOR
IRRIGATION CHANNEL
YARDS
YARDS

Fig. 76

Table L VI

Rabi Season-1960-61(Ghatampur)

	MONTHS					
	November	December	January	February	March	Total
Rainfall in inches in the rabi season 1960-61	...	...	2.54	0.25	...	2.79
Rainy days in the rabi, 1960-61	...	...	6	2	...	8
Average rainfall in inches	0.03	0.21	0.76	0.58	0.24	1.82

Land Classification

The soil of the area in which the village is situated is mainly clayey. (Fig. 25) The Writer has made an attempt to classify the village fields on the basis of fertility, productivity and facilities of irrigation.(See page 57) The classification of land is shown in Fig.76. The soil of the good quality lands(A) is from light clay to loamy clay and is provided with the facilities of canal irrigation. These lands either are capable of raising two crops a year or are devoted to sugarcane.The soil of the medium quality lands (B) is clayey and is less productive than (A). These lands are left fallow in the kharif or they are devoted to pulses mixed with millet. Rice is especially adopted to these lands of the village. The poor quality lands are unutilized due to the presence of high salt content.

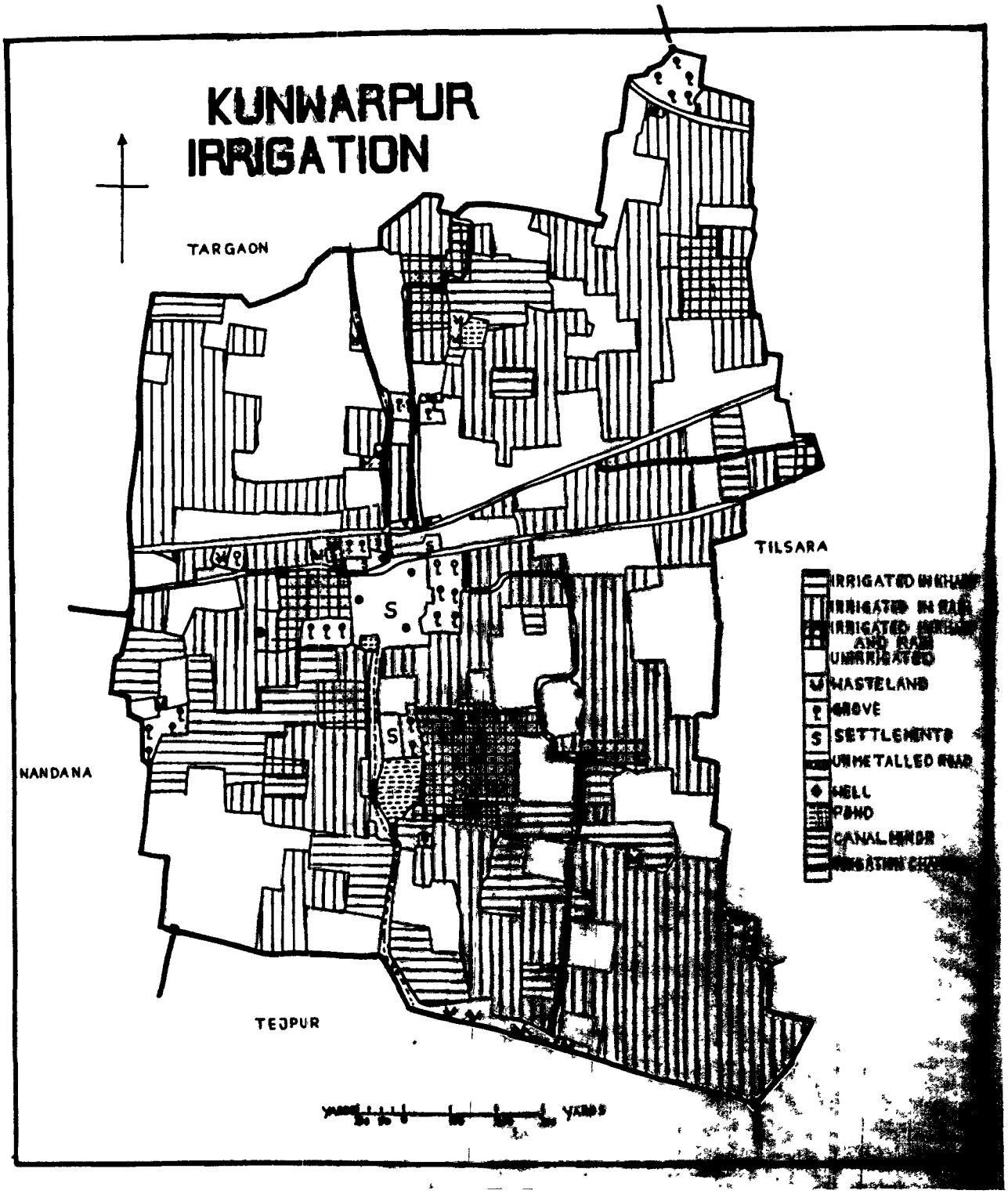

KUNWARPUR
IRRIGATION
TARGAON
TILSARA
NANDANA
TEJPUR
WASTELAND
GROVE
SETTLEMENTS
WELL
POND

Fig. 77

Irrigation

The whole area of the village is watered from the Targaon and Tilsara minors of Bhadras distributary of the Lower Ganga canal. The area irrigated in the kharif and rabi seasons for the year 1960-61 is shown in Fig. 77. It will be seen from Table IV that the amount of rainfall in the kharif season was 46.9 inches, which was more than the averageamount of rainfall. The rainfall was also wide spread in the months of July, August and September with this result none of the kharif crops except broadcast rice and sugarcane was irrigated. Fields of rice broadcast and sugarcane were watered in the months of June. October received about 8 inches of rainfall, which was 7 inches more than the average, with this result not only the sowing of rabi crops was delayed, but some of the standing kharif crops were damaged also.

Table L VI shows that November and December were dry, with the result, the fields of wheat, peas, potatoes were watered sometimes in the late December, but the amount of rainfall for the months of January and February wassadequate, therefore, these crops, except Potato were not irrigated again.

Land Utilization

The use of land in the village is shown in Figs. 78 to 81. On the basis of the Writer's field work,[1] the

(1) The base map showing the fields and their areas was obtained from the Lekhpal of the village concerned with the permission of Tahsildar of the Ghatampur tahsil. Kunvarpur was visited by the Writer in the kharif season of 1960, and the rabi season of 1961, and the use of which each field was being put recorded on the base map. From these data Figs. 78-81 were prepared.

following Table gives a summary of the proportions of the village lands devoted to various uses in 1960-61.(Fig.78)

Table L VII

Total area of the village — 368.13 acres

Use of land	Area in acres	Percentage of the total area
Cultivated land	336.19	91.32
Wasteland	4.11	1.12
Groves[1]	11.07	3.01
Settlement	5.99	1.63
Road	3.05	0.83
Pond	2.76	0.75
Irrigation channels	4.96	1.34
Total	368.13	100.00

It will be seen from the above Table that 91 per cent of the land is arable, 5 per cent is under non-agricultural uses, 3 per cent is under groves while only 1 per cent is not utilized.

A comparison of Figs. 76 and 78 shows a pronounced ralationship in the quality of land and the size of the fields. The fields of the good quality lands are usually small, while that of the medium quality lands are relatively large in size. The Table L VIII shows the different size-groups of plots in the village.

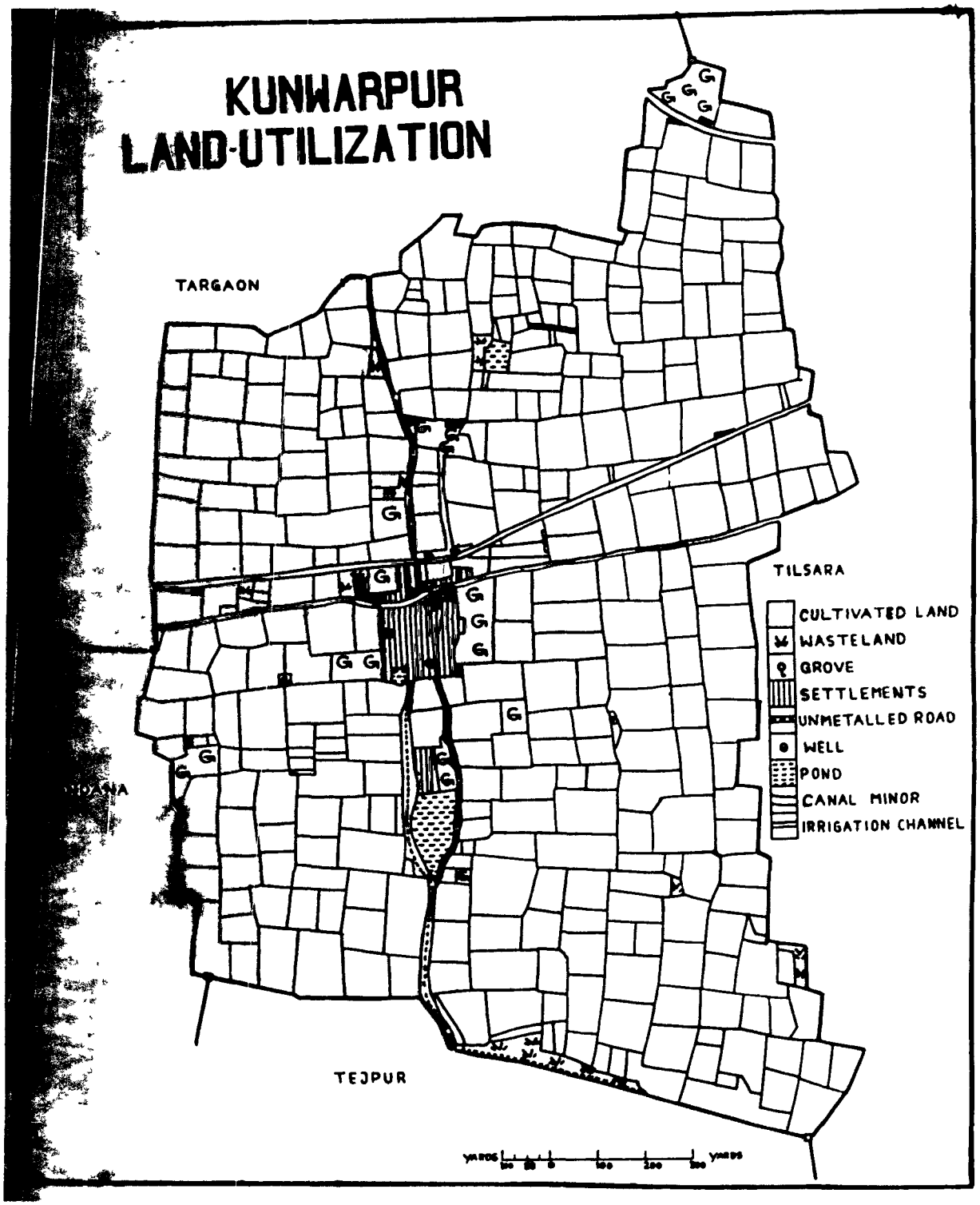

KUNWARPUR
LAND-UTILIZATION
TARGAON
TILSARA
TEJPUR
CULTIVATED LAND
WASTELAND
GROVE
SETTLEMENTS
UNMETALLED ROAD
WELL
POND
CANAL MINOR
IRRIGATION CHANNEL

Fig. 78

Table L VIII

Size of plots	Number of plots of each size	Percentage of the plots of each size to the total number of plots
Below 0.50 acre	91	22.8
0.50 acre to 1.0 acre	135	33.8
1.0 acre to 2.0 acres	146	36.6
2.0 acre to 3.0 acres	22	5.5
over 3 acres	5	1.3
Total	399	100.00

It will be seen from the above Table that the number of the plots varying between 1 and 2 acres in size is large, covering about 37 per cent of the total number of plots, the plots varying between 0.50 to 1 acre in size cover another 34 per cent of the total, while 91 plots are very small in size and are below 0.50 acre. Only 27 plots of the village are over 2 acres in size.

Land Utilization in the Kharif Season

The land use of the village in the Kharif season of 1960 is mapped in Fig. 79. The area occupied by each crop is shown in Table L IX.

Table L IX

Gross cultivated land 336.19 acres
Net cropped area in the kharif season 170.68 acres

Crops	Area in acres	Percentage of the gross cultivated land	Percentage of net cropped land	Total percentage of gross cultivated land	Total percentage of net cropped land
GRAIN CROPS:-				34.29	67.55
Rice	36.46	10.85	21.36		
Millets & Pulses	62.90	18.71	36.86		
Millet	8.23	2.45	4.82		
Pulses	6.10	1.81	3.57		
Bulrush millet	1.35	0.40	0.79		
Maize	0.25	0.07	0.15		
OTHER CROPS:-				16.42	32.45
Sweet potato	15.09	4.49	8.84		
Sugarcane	3.61	1.07	2.12		
Vegetables	0.66	0.20	0.39		
Fodder	17.49	5.21	10.24		
Sesamum	12.53	3.73	7.34		
Cotton	2.13	0.63	1.25		
San-hemp	3.88	1.15	2.27		
Fallow	165.51	49.23	..	49.23	...
Total	336.19	100.00	100.00	100.00	100.00

It will be seen from the above Table that a little more than two-thirds of the net cropped land in the kharif season is occupied by grain crops. Of these, millets mixed with pulses and rice are the important crops. Rice covers about 21 per cent of the total cropped land in the kharif season. It has been observed earlier that as village is situated on the higher level than that of the surrounding villages, depressions, with clayey soils do not find place in the village. But the soil is loamy clay, therefore, rice

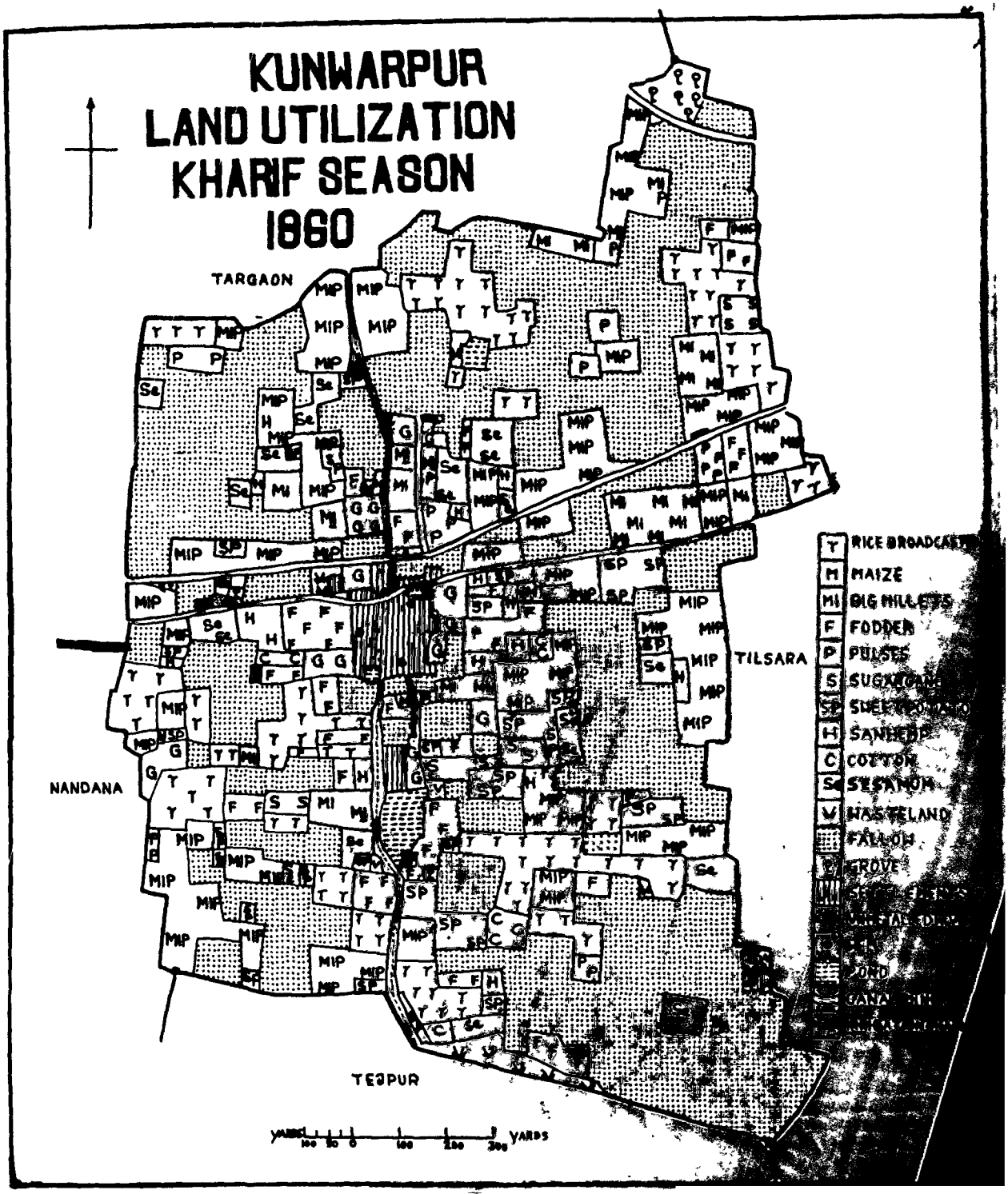

KUNWARPUR
LAND UTILIZATION
KHARIF SEASON
1960
TARGAON
TILSARA
NANDANA
TEZPUR
T RICE BROADCAST
M MAIZE
MI BIG MILLETS
F FODDER
P PULSES
S SUGARCANE
SP SWEET POTATO
H SANHEMP
C COTTON
SE SESAMUM
W WASTELAND
FALLOW
GROVE
YARDS

Fig. 79

broadcast is sown in the village before the commencement of the monsoon, rains, usually either in the last week of April or in the first week of May. If there is a searcity of canal irrigation in these months, the sowing of rice is either delayed, or sometimes farmers can not get an apportunity to sow the seeds in proper time.[1] With this result the acreage under rice reduces and the land is left fallow in the kharif season. Millet mixed with pulses is by far the most important crops of the year 1960 and it covers about 37 per cent of the net cropped land. Millet, pulses (urd and moong), bulrush millet and maize are other grain crops together occupy about 9 per cent of the cropped land. Among the other crops, fodder, sweet potato and til[2] are important. Fodder occupies one-tenth of the net cropped area but the area under the same in the village needs to be extended. The grazing grounds are almost absent from the village. Therefore, in the absence of grazing grounds, the livestock are ill-fed almost all the year round. The shortage of fodder affects the efficiency of cattle and results in a reduced supply of dairy products.

Sweet potato occupies about 9 per cent of the net cropped land. It is a low creeping plant, which covers the ground thickly with a mass of smooth leaves. Cut pieces of the roots are planted in the ground early in the rains, each of them starts a new plant and by December large thick roots are formed,

---

(1) In the year of inquiry, rice broadcast could not be sown in the large area, due to scarecity of canal irrigation.

(2) The botanical name of til is Sesamum-indicum.

which are dugup for food. These roots are eaten by the villagers as vegetables, often curried and are also used in preparing various sweetmeats. They are also sold in the neighbouring markets of Patara and Gajner. The leaves are good food for cattle.

The cultivation of til is of a great significance to this village, which itself occupies about 7 per cent of the net cropped area. Til is sown as sole crop and is grown as medium quality lands with hurried and imperfect tillage. It is sown as late as in the month of August, and ripens in the month of October or in early November, when the plants are cut with sickle and allowed to dry in bundles. They are then beaten on the ground and the seeds fallout of the capsules. The stalks are used for fuel. The oil is extracted from the seeds and is used for food, cooking, and toilet etc., while the residue of the seeds is known as oilcake, and is a valuable food for cattle. However, it is the cash crop for the villagers, and is sold in the neighbouring markets.

49.23 per cent of the gross cultivated land is left fallow in the kharif season. It is clear from Fig. 79 that these lands are mostly confined to the south-east corner of the village, as some of these lands could not be devoted to broadcast rice due to scarcity of canal irrigation, while the remaining fields are not capable of producing two crops a year.

Land Utilization in the Rabi Season

The use of land in the rabi season of 1960-61 is illustrated in Fig. 80. The area occupied by each crop

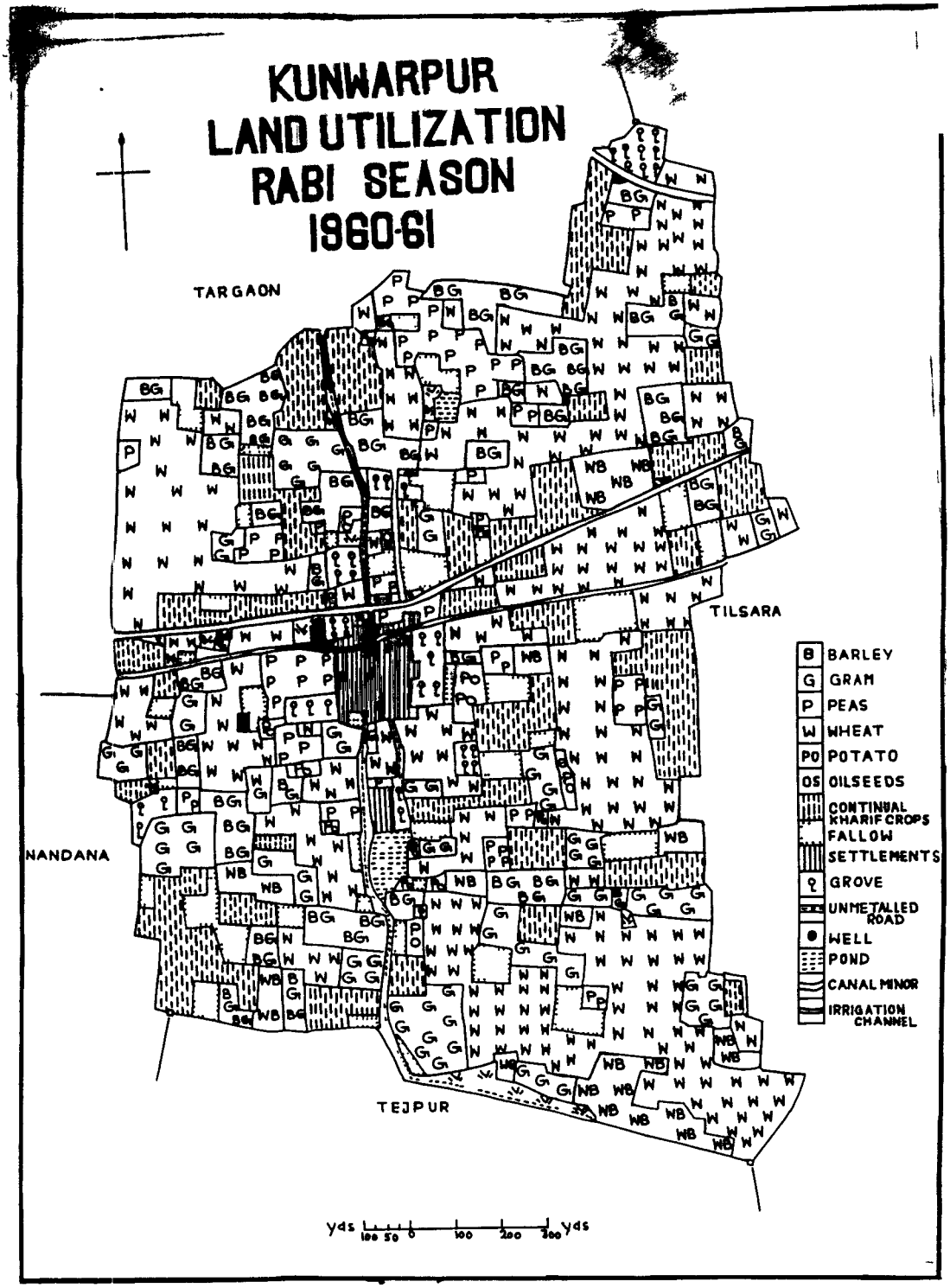

KUNWARPUR
LAND UTILIZATION
RABI SEASON
1960-61
TARGAON
TILSARA
NANDANA
TEJPUR
B BARLEY
G GRAM
P PEAS
W WHEAT
PO POTATO
OS OILSEEDS
CONTINUAL KHARIF CROPS
FALLOW
SETTLEMENTS
GROVE
UNMETALLED ROAD
WELL
POND
CANAL MINOR
IRRIGATION CHANNEL
yds 100 50 0 100 200 300 yds

Fig. 80

in the season is shown in the following Table.

Table LX

Gross cultivated land 336.19 acres
Net cropped land in the rabi season 241.90 acres

Crops	Area in acres	Percentage of gross cultivated land	Percentage of net cropped land	Total percentage of gross cultivated land	Total percentage of net cropped land
GRAIN CROPS				71.00	98.67
Wheat	129.77	38.60	53.65		
Barley mixed with gram	39.49	11.75	16.32		
Gram	32.32	9.61	13.36		
Peas	19.78	5.88	8.18		
Wheat mixed with barley	15.72	4.68	6.49		
Wheat mixed with gram	1.62	0.48	0.67		
OTHER CROPS:				0.96	1.33
Potatoes	2.92	0.87	1.21		
Oil seeds	0.28	0.09	00.12		
Continual kharif crops	66.51	19.78	..	19.78	..
Fallow	27.78	8.26	..	8.26	..
Total	336.19	100.00	100.00	100.00	100.00

It will be seen from this Table that wheat is the major crop and itself occupies 54 per cent of the net cropped land in the rabi season. Barley mixed with gram and gram as a sole crop occupy 16 and 13 per cent of the net cropped land respectively. A comparison of Figs. 76 and 80 shows that wheat and barley mixed with

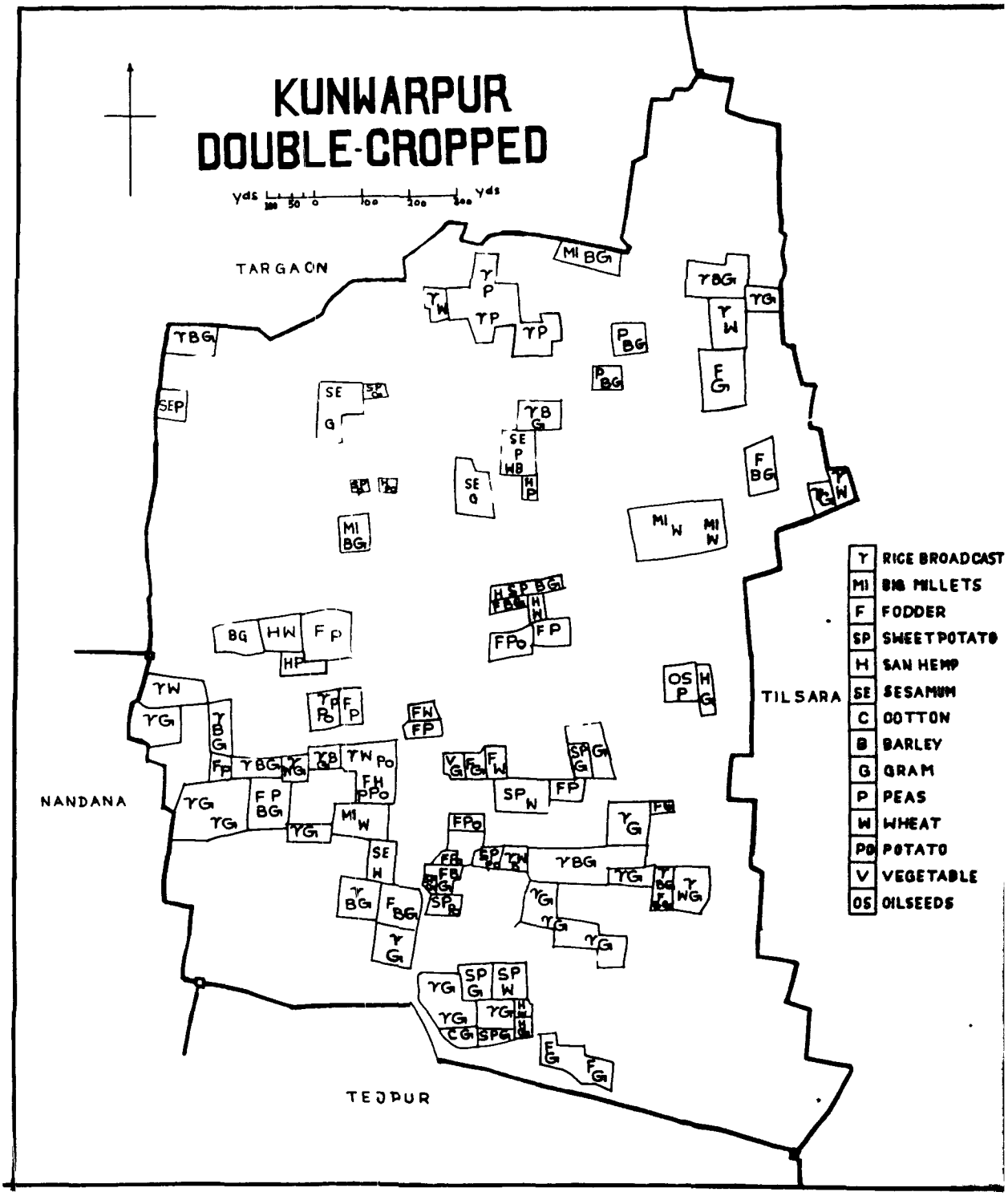

KUNWARPUR
DOUBLE-CROPPED
Yds 100 50 0 100 200 300 Yds
TARGAON
TILSARA
NANDANA
TEJPUR
Y RICE BROADCAST
MI BIG MILLETS
F FODDER
SP SWEETPOTATO
H SAN HEMP
SE SESAMUM
C COTTON
B BARLEY
G GRAM
P PEAS
W WHEAT
PO POTATO
V VEGETABLE
OS OILSEEDS

Fig. 81

gram occupy the lands, which were left fallow in the kharif season.

Double Cropped Land

The double cropped land in the village is depicted in Fig. 81. The total area cropped twice in the year 1960-61 was 71.74 acres or about 21.31 per cent of the gross cultivated land. Usually, good quality lands are cropped twice a year. Double cropping in this village is also based upon the availability of canal water supply. The area under double cropping, in the year of inquiry, was reduced due to the large percentage of the fallow lands in the kharif season, which could not be sown because of the scarcity of canal water at the time of sowing of broadcast rice in the village.

Land use and Population

Table LXI shows the totals of various classes of lands as well as the per capita share of the villagers in these lands.

Table LXI
Total population of kunwarpur depending upon the produce of the village ---- 528[1]

	Total area of the village	Total available land for cultivation	Net cropped land in the kharif season	Net cropped land in the rabi season	Total cultivated land both of kharif & rabi	Double cropped land
Area (in acres)	368.13	336.19	170.68	241.99	412.68	71.74
Land per head of population	0.70	0.64	0.32	0.46	0.78	0.13

(1) Actual Population of the village recorded at the time of census, a)1961-----571. Contd...2

The Table LXI shows that the per head shares of cultivated land in the village is 0.64 acre, but in the kharif and rabi season it is reduced to 0.32 and 0.46 acre respectively. In the kharif season, the reduction in the per capita share of cultivated land is due to the practice of fallowing, while in the rabi season some of the arable land remains occupied by continual kharif crops such as sugarcane and pulses.

Table LXI further shows that the per capita double cropped land is only 0.13 acre. Thus, the per capita gross cultivated land (both of kharif and rabi seasons) is 0.78 acre. In other words, the amount of cultivated land supporting one person is 0.78 acre, which is comperatively lower than that of the village Khandhan. Therefore the standard of living and health of the people of this village is comparetively lower. The only solution for increasing the standard of the people of the village lies in increasing of the productive capacity of the land. The following Table shows the relative productive capacity of the various types oflands in the village.

Table LXII
Average yield per acre of good farm land--1360lb. = 1 P.P.U.

Types of land	Area in acres	Average yield in lb. per acre	Productivity rating per acre	Number of P.P.U.
Good quality lands(A)	75.35	2340	1.7	128.09
Medium quality lands(B	260.84	1360	1.0	260.84
Poor quality lands (C)	4.11	..	..	...
Total	340.30			388.93

Contd...(b)Number of persons of the outside village depending upon the produce of the village Kunwarpur--69. (c) Number of persons of this village who do not depend upon the produce of the village-112.Therefore total population of Kunwarpur actually depending upon the produce of the village is (571+69-112)= 528.

It will be seen from Table LXII that 340.20 acres of culturable land of Kunwarpur give a total of 339 P.P.U. (Potential Productive Units). The area under poor quality land is very small, therefore, the scope for increasing P.P.U. lies mainly in converting some of the medium quality land into the good quality land. It means, the productive capacity of the village can be only increased by increasing the double cropped area of the village.

The significance of the pressure of population on land can be fully appreciated, if the occupation of the villagers are considered. It can be seen from the fact that about 80 per cent of the total population is entirely dependent upon land, while 20 per cent belongs to the secondary rural group while indirectly depends upon the primary rural population. 'Kurmis' are skilful cultivators of the village who are very proud of their agriculture. Every able member of their family is in the field from morning till evening.[1]

xxxxxxxxxxxx
xxxxxxxxxx

(1) Every one knows the proverb about this caste:-
"Bhali jati kunbin ki khurpi haath, kheth nirave apne pi ke saath"
The meaning is:- A good caste is the Kunbin, with hoe in hand. They weed the fields together with their husbands.

C_H_A_P_T_E_R VII

GROUP III : KACHHAR :

(A)

Bisayakpur Kachhar

Akbarpur Birbal Kachhar

Baijamau kachhar

LAND UTILIZATION IN BISAYAKPUR KACHHAR[1]

Location

The village of Bisayakpur is merely a suburb of the Kanpur city and actually lies within the corporation limits at a distance of about 6 miles north-west of the city. The village is situated at $26^{0}30'$N latitude and $80^{0}17'$ E longitude and bounded by the villages of Kheora kachhar in the north-east and east, Bisayanpur Bangar in the south and Bari Akbarpur in the west.

The village is located in the narrow and lowlying fertile stretch of kachhar of the river Ganga. It is inside

(1) Bisayakpur, topographically has been divided into two parts: Bisayakpur Bangar lying on the high level and Bisayakpur kachhar, by the revenue authorities in the last settlement. The Writer has selected only the kachhar area of the village for his proposed sample survey, which is inhabited, while the village settlement is only confined to the bangar area of the same village.

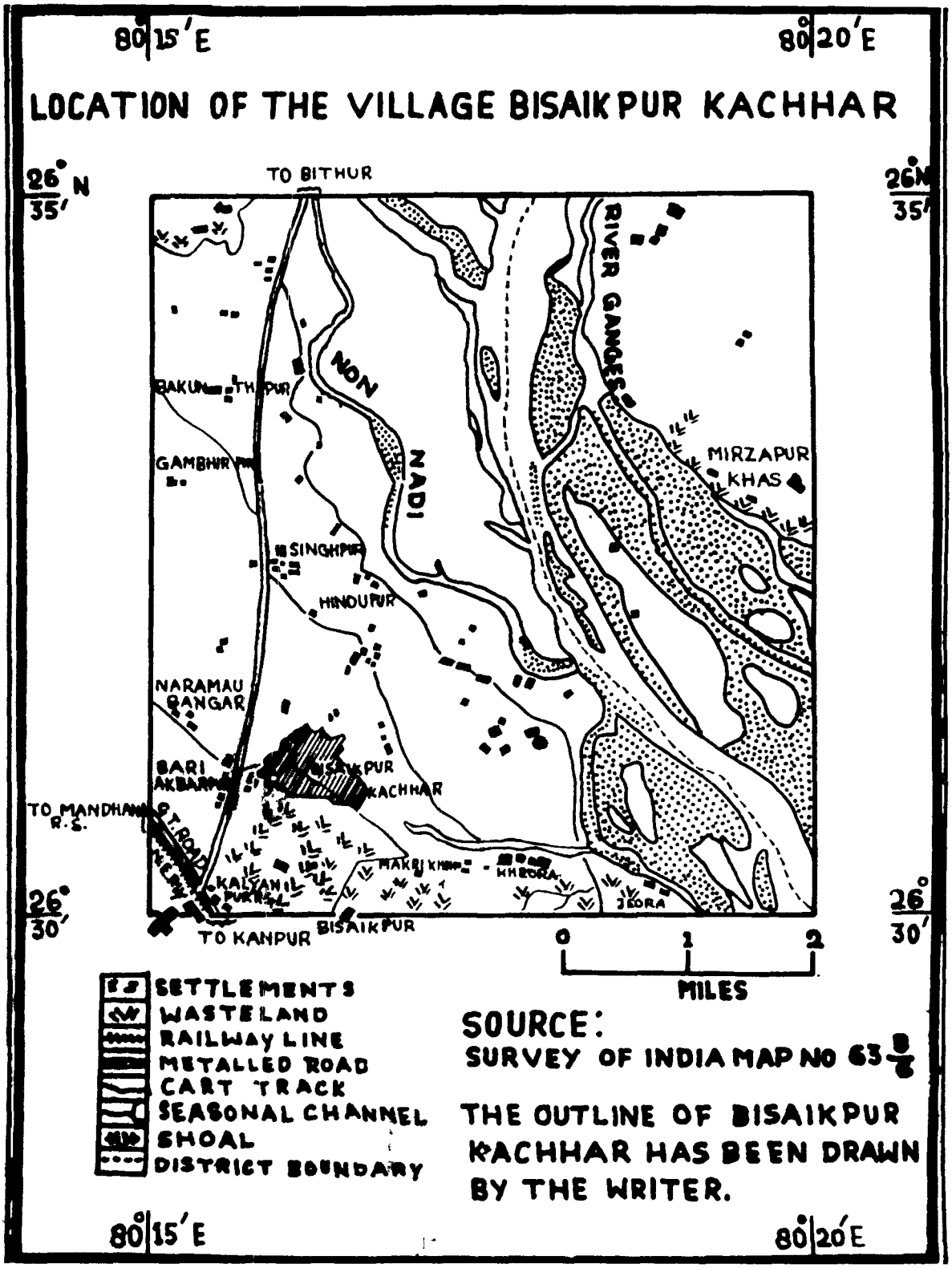

80° 15′ E
80° 20′ E
LOCATION OF THE VILLAGE BISAIKPUR KACHHAR
26° 35′ N
26° 30′
TO BITHUR
RIVER GANGES
NON NADI
MIRZAPUR KHAS
SINGHPUR
HINDUPUR
NARAMAU BANGAR
BARI AKBARPUR
KACHHAR
TO MANDHANA R.S.
KALYANPUR
MAKRI KHURD
KHEORA
JEORA
TO KANPUR
BISAIKPUR
0 1 2
MILES
SETTLEMENTS
WASTELAND
RAILWAY LINE
METALLED ROAD
CART TRACK
SEASONAL CHANNEL
SHOAL
DISTRICT BOUNDARY
SOURCE:
SURVEY OF INDIA MAP NO 63 B/6
THE OUTLINE OF BISAIKPUR KACHHAR HAS BEEN DRAWN BY THE WRITER.

Fig. 82

the fluvial action of the river and subject to inundation during the wet monsoon months. Deposits of sand or sandy silt are left when the floods subside. At present the main current of the river flows to the north of the village at about one and half miles, but a small channel flows close to the north and north-east of the village.

There is an unmetalled road which connects the village with the market of Nawabganj[1] about 3 miles to the east of the village and it also joins the metalled road[2] at Bari Akbarpur about 2 miles to the north-west of the village.(Fig. 32)

The village is also linked with the Grand Trunk Road at about one mile east of Kalyanpur, which is a railway station on the N.E. Railway, which runs parallel to the Grand Trunk Road. Thus the village has an easy access to the markets of Nawabganj Kalyanpur and Bari Akbarpur. It will be seen later in this chapter that accessibility to markets has an appreciable influence on the land use of the village.

Climate:

No climatic data are recorded in the village. The nearest rainfall recording station from the village is Kanpur. The data of the headquarters of the Kanpur tahsil, lying about 6 miles to the south-east of the vil[illegible] may be taken as close approximations

(1) Nawabganj, a suburban part of the city, is the main collecting and distributing centre of vegetables and fruits and is the joining link between the village and city.
(2) This metalled road takes off the main high way near Kalyanpur railway station and leads to the town of Bithur.

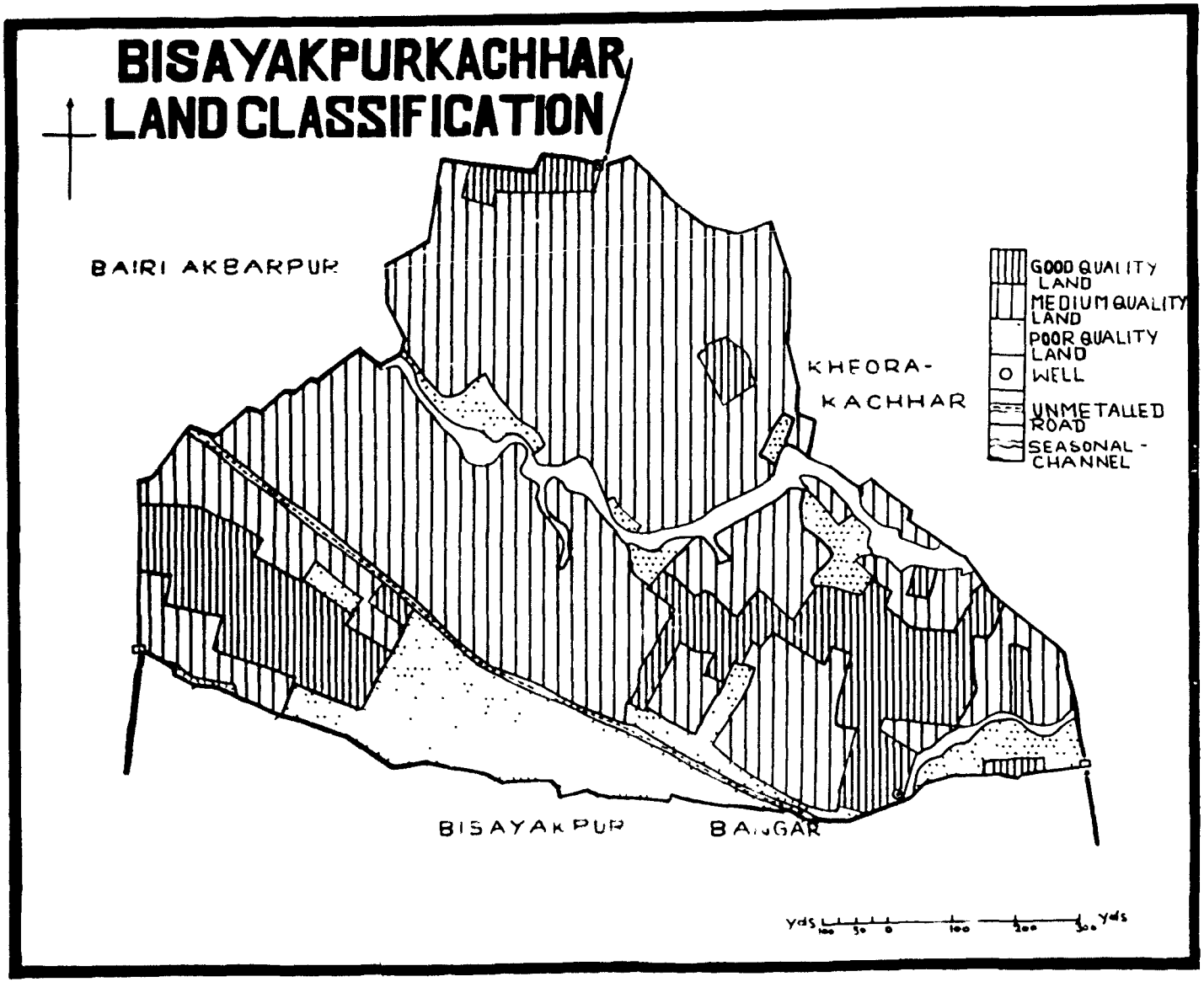

BISAYAKPURKACHHAR
LAND CLASSIFICATION
BAIRI AKBARPUR
KHEORA-
KACHHAR
BISAYAKPUR
BAJGAR
GOOD QUALITY LAND
MEDIUM QUALITY LAND
POOR QUALITY LAND
WELL
UNMETALLED ROAD
SEASONAL - CHANNEL
Yds
Yds

Fig. 83

for this village, which have been given in Tables XI and XII (see page.83-84)

Land Classification

The soil of the kachhar in which the village is situated varies mainly from sandy to light sandy loam. An attempt has been made by the Writer to classify the village fields on the basis of fertility and productivity (see page.57), which have been differentiated in the Fig. 83.

The soil of the good quality land (A) mainly consists of silty sand and sandy loam and is devoted to the sugarcane and the fruit gardening. The soil of the medium quality lands(B) is light sandy loam. These lands are left fallow in the kharif as they are flooded during the spate. The soil of the poor quality land is unproductive due to the presence of considerable degree of injurious salts.

Irrigation

No irrigation is practised in the village. The water is so near the surface and the subsoil is so porous that even in the hottest month the crops are sufficiently supplied with moisture and even sugarcane fields are not irrigated.

Land Utilization

The use of land in the village of Bisayakpur kachhar in 1960-61 is shown in Figs. 84 to 86.[1] The existing intensity

(1) The base map showing the fields and their areas was obtained

Contd...2

of utilisation of lands, in its briefest outline, is as under:--

Table LXIII

Total area of the village----162.88 acres

Use of land	Area in acres	Percentage of the total area
Cultivated land	130.99	80.42
Wasteland	23.33	14.32
Grove[1]	1.51	0.93
Road	1.40	0.86
River channels	5.65	3.47
Total	162.88	100.00

It will be seen from the above Table that nearly eight-tenths of the total land of the village is cultivated, 3 per cent of the total area is occupied by river channels and river springs, while 14 per cent is wastland and unutilized due to the presence of reh.

The size of the fields varies between below 0.50 acre to over 2 acres. Table LXIV will show the different size groups in the village in 1960-1961.

Contd...obtained from the lekhpal of the village concerned with the permission of the Tahsildar of the Kanpur tahsil. The village was visited by the Writer in the kharif seasonof 1960 and the rabi season of 1961 and the use to which each field was being put was recroded on the base map. From these data Figs. 84 to 86 were prepared.

(1) Actually groves are not found in the village.Guava Bagh lies to the north of the village.

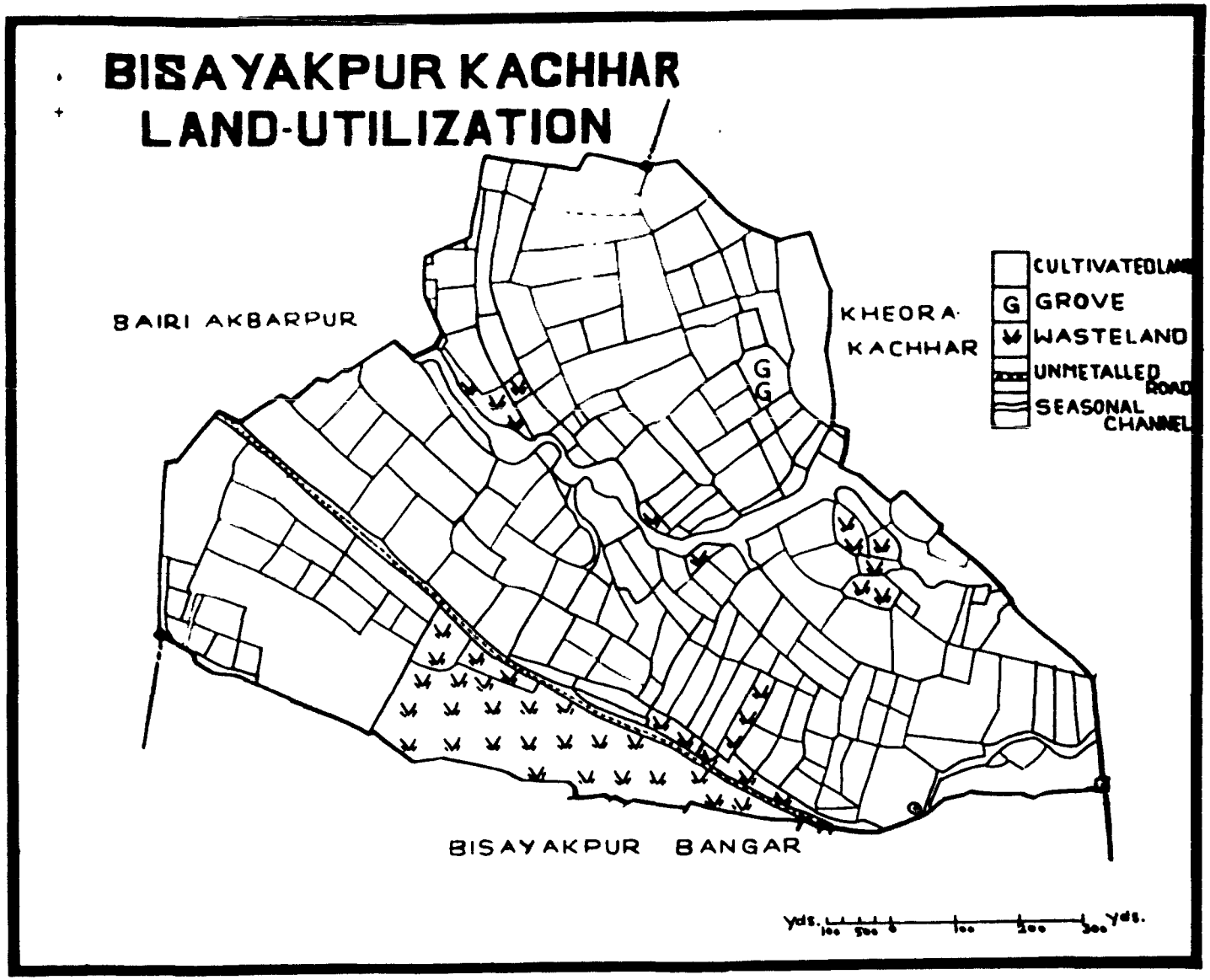

BISAYAKPUR KACHHAR
LAND-UTILIZATION
BAIRI AKBARPUR
KHEORA
KACHHAR
BISAYAKPUR BANGAR
G
G
G GROVE
WASTELAND
UNMETALLED ROAD
SEASONAL CHANNEL
Yds.
Yds.

Fig. 84

Table LXIV

Size of fields	Number of fields of each size	Percentage of the fields of each size to the total number of the fields
Below 0.50 acre	83	40.0
0.50 acre to 1.0 acre	81	38.9
1.0 acre to 2.0 acres	34	16.3
2.0 acre to 3.0 acres	6	2.9
over 3.0 acres	4	1.9
Total	208	100.00

It will be seen from the above Table that the fields are very small in size. 83 fields or 40 per cent of the total are below .50 acre and are widely scattered throughout the village (Fig. 83). 81 fields vary between .50 to 1 acre and cover another 39 per cent of the total. Only 21 per cent of the total number of fields are over 2 acres in size, in which only 4 fields are over 3 acres. Thus the size of the fields is comparatively smaller than the other villages. Fig.83 shows that the plots of over 2 acres in size either belong to the wasteland or water bodies.

Land Utilization in the Kharif Season

The use of land in the kharif season of 1960 is shown in Fig.85 The Table LXV shows the distribution of area occupied by each crop.

Table LXV

Gross cultivated land 130.99 acres
Net cropped land in the kharif season 23.09 acres

Crops	Area in acres	Percentage of gross cultivated area	Percentage of net cropped area
Sugarcane	20.28	15.48	87.83
Fodder	1.85	1.41	8.01
Rice(Transplanted)	0.63	0.48	2.73
Pulses	0.33	0.25	1.43
Fallow	107.90	82.38	..
Total	130.99	100.00	100.00

It will be seen from the above Table that sugarcane is the major crop and occupies nearly 88 per cent of the net cropped land in the kharif season. The village has the largest acreage of 20.28 under cane cultivation out of all the fourteen sample villages. One of the reasonsfor the largest acreage of cane cultivation in the village is the construction of a sugar mill attached to the National Sugar Institute, located at Nawabganj at a distance of 3 miles from the village. One-fourth of the entire production of cane is crushed from whose juice Gur is prepared but remaining of the yield is sold in the sugar mill. Thus, the land use of this village is the result not only of geographical factors but also of industrial

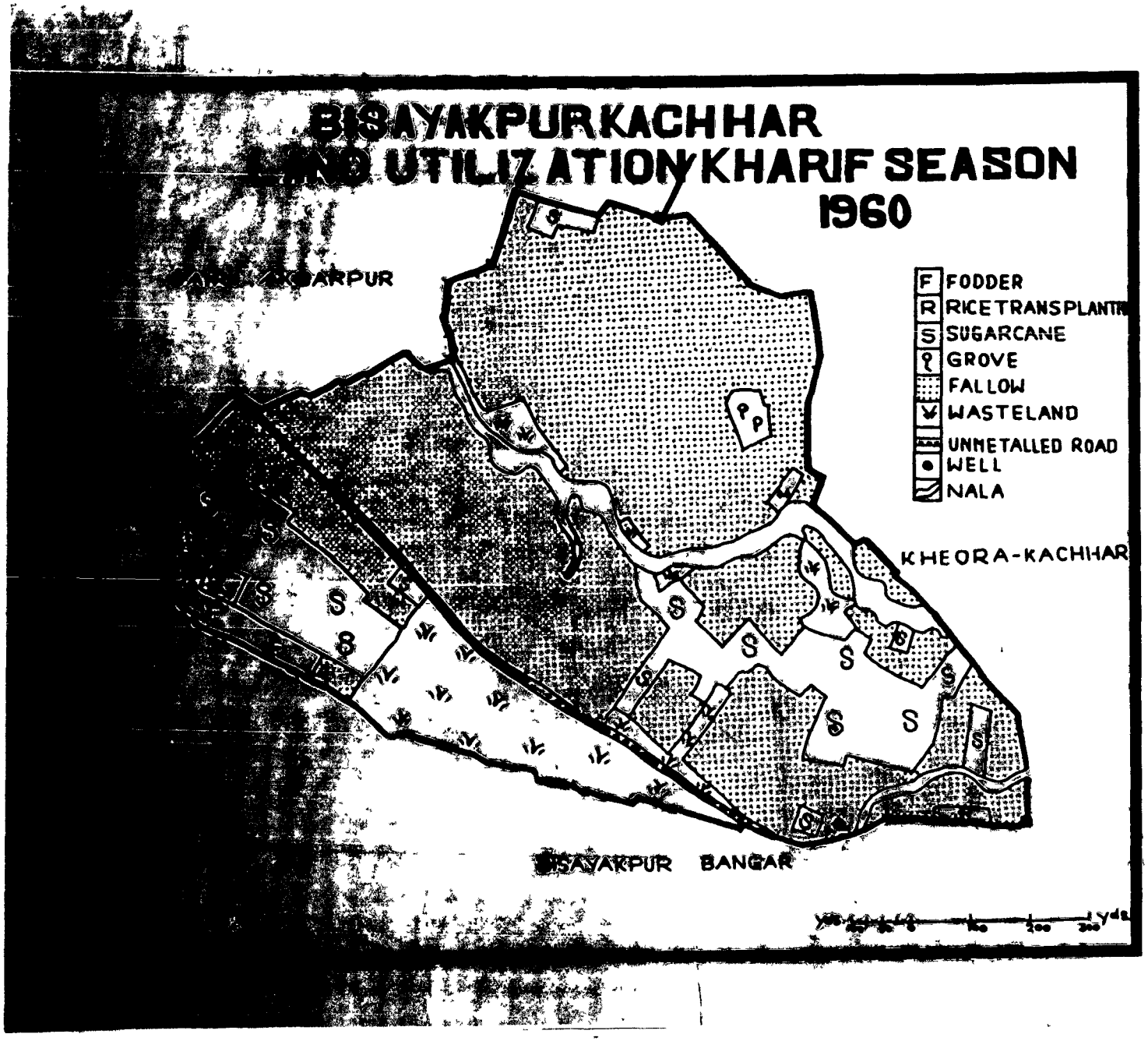

BISAYAKPUR KACHHAR
AND UTILIZATION KHARIF SEASON
1960
F FODDER
R RICE TRANSPLANTE
S SUGARCANE
G GROVE
FALLOW
W WASTELAND
UNMETALLED ROAD
WELL
NALA
KHEORA-KACHHAR
BISAYAKPUR BANGAR

Fig. 85

impact. The crop occupies the good quality land in the village and its cultivation is confined to south-east and middle of the western part of the village. Generally ratoons are grown in the month of March, when the temperature is sufficient for the growth of crop. It is harvested about the month of November but the cane fully matures by the middle of January. The canes grown in this village are very thin. The development of cane cultivation in the village calls for the adoption of better varieties of cane. But the soil should also be fed with adequate supply of manure and should be provided with the facilities of irrigation.

Next in importance to sugarcane is the fodder crop which covers 8 per cent of the cropped land. A large section of the population keep milch cattle and supply milk to the city, as the village is in the close vicinity of Nawabganj. The fodder grown in the village consists of war locally known as 'chari'. Thus it is clear that villagers entirely depend upon the cane cultivation and dairy farming, which both bring cash to them.

Grain crops such as rice and pulses together cover negligible area and occupy an insignificant position in the kharif season.

About 83 per cent of the gross cultivated area is left fallow in the Kharif season for these lands are inundated during the rains.

Land Utilization in the Rabi Season

The use of land in the rabi season of 1960-61 is mapped in Fig.86. The Table below shows the area occupied by each crop in the season.

Table LXVI

Gross cultivated area 130.99 acres
Net cropped land in Rabi Season 64.82 acres

Crops	Area in acres	Percentage of gross cultivated land	Percentage of net cropped land	Total percentage of gross cultivated land	Total percentage of net cropped land
GRAIN CROPS:				44.33	97.42
Barley	48.84	35.49	77.93		
Barley & Peas	7.16	5.20	11.43		
Wheat	4.90	1.96	4.31		
Peas	1.94	1.41	3.10		
Wheat & Barley	0.37	0.27	0.59		
OTHER CROPS:				1.17	2.58
Vegetables	0.93	0.68	1.49		
Linseed	0.68	0.49	1.09		
Continual kharif crops	20.28	15.48	..	15.48	
Fallow	45.89	39.02	..	39.02	
Total	130.99	100.00	100.00	100.00	100.00

It will be seen from the above Table that 97 per cent of the net cropped land in the rabi season is devoted to grain crops, of these, barley occupies a little more than three-

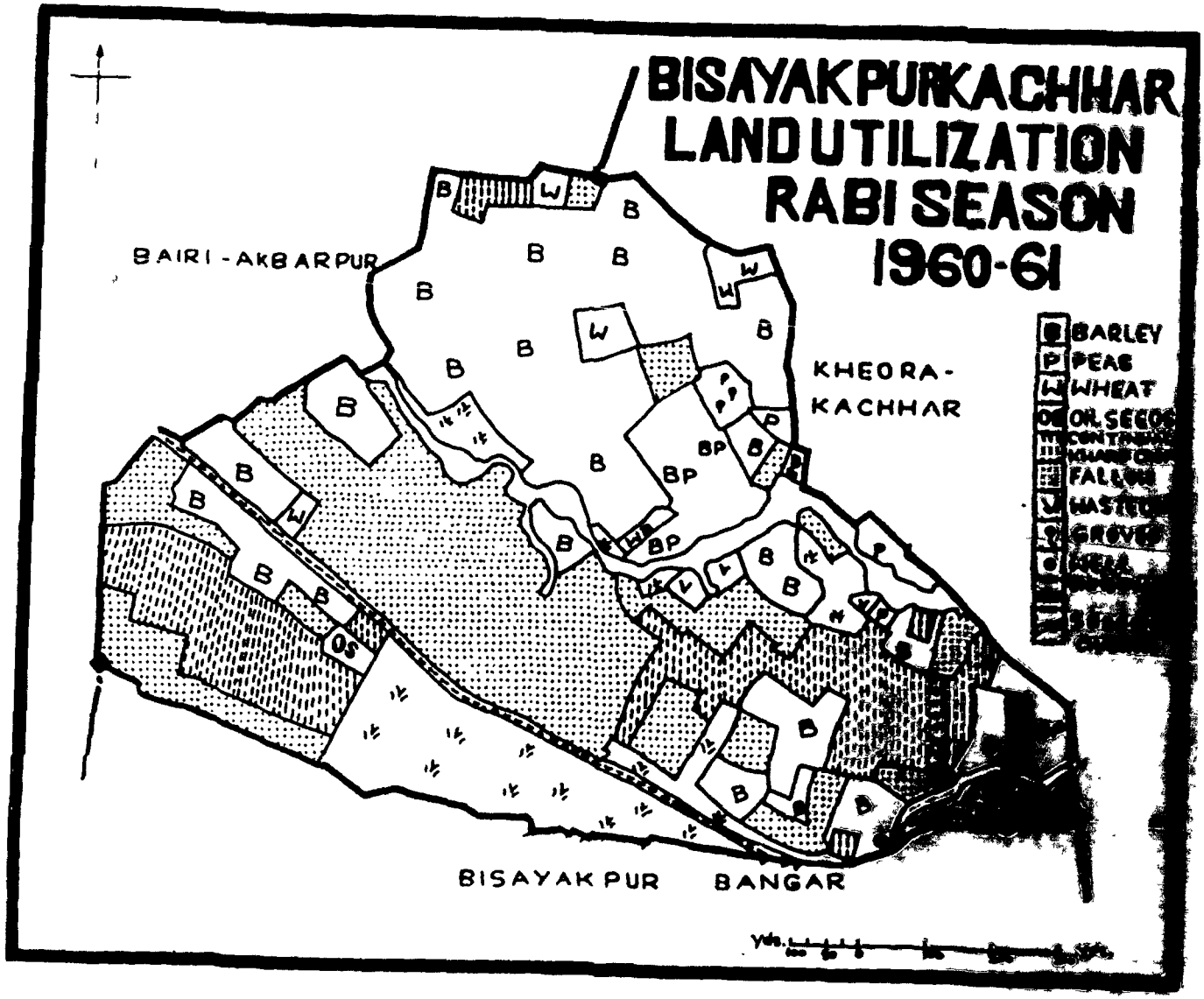

BISAYAKPURKACHHAR
LAND UTILIZATION
RABI SEASON
1960-61
BAIRI-AKBARPUR
KHEORA-
KACHHAR
BARLEY
PEAS
WHEAT
FALLOW
BISAYAK PUR
BANGAR

Fig. 06

fourths and barley mixed with peas another one tenth of the net cropped land. A comparison of Figs.83and.86 shows that the medium quality lands, which are left fallow in the kharif season are devoted to borley sown as a sole crop for mixed with peas.

It is remarkable, that sugarcane as a continual kharif crop comes next to barley covering about 15.48 per cent of the gross cultivated land.

About four-tenths of the gross cultivated area is left fallow in the rabi season. As in the year of inquiry, there was heavy rainfall in the month of October(Table XI.) and the medium quality lowlying fields remained flodded during the month of November, the sowing of rabi crops was not only delayed, but these fields were left fallow in the rabi season also. Some of the fields were reserved and kept prepared during the month of January and February for the cultivation of sugarcane. These plots, which are ploughed for the sowing of sugarcane in the month of March are known as 'Padra'

Double Cropped Land

It is clear from the field work done by the Writer in the year 1960-61 that not a single acre was devoted to double cropping. Low lying topography does not allow the farmers to produce two crops in a year. The medium quality lands with lighter soil and liability to flodd can not be cultivated twice in the year and therefore are left fallow in the kharif and even some acreage of these is left in the rabi season also, while parts of the good quality

land capable of double cropping are used for the cultivation of sugarcane which brings some cash to the villagers.

Land use and Population

The following Table shows the totals of various categories of land as well as the per capita share of the villagers in these lands.

Table LXVII

Total population[1] depending upon the produce of the village 91

	Total area of the village	Total available land for cultivation	Net cropped land in the kharif season	Net cropped land in the rabi season	Total cultivated land(both of kharif & rabi)	Double cropped land
Area in acres	162.88	130.99	23.09	64.82	89.91	...
Land per head of population	1.79	1.44	0.25	0.71	0.96	...

The above Table shows that the per capita land available for cultivation is 1.44 acres, but in the kharif season

(1) Village Bisayakpur kachhar is practically unpopulated, peasants of Bisayakpur Bangar and Makri khon usually cultivate the entire kachhai lands of Bisayakpur. Therefore, the number of persons actually depending upon the produce of the village is based upon the personal inquiry of the Writer.

the per capita land is reduced to only 0.25 acre. The drop in the per capita cultivated land is due to the fact that medium quality lands are left fallow in that season. In the rabi season the reduction of per capita is not only due to the continual kharif crop, such as sugarcane but also, continual fallowing of the medium quality lands due to the heavy amount of rainfall in the month of October, That is why per capita of cultivated land was also reduced from 1.44 to 0.96 acre. Thus, inother words, the amount of land supporting one person in Bisayak pur kachhar is 0.96 acre and even lower than the perhead available land for cultivation.

As far as the occupational structure of the population is concerned, 91 persons, coming from out side the village entirely depend upon land and hence the question of the secondary rural group does not arise. The following Table shows the potential productive capacity of the village.

Table LXIII

Avera e yield per acre of good farm land-------900 lb. of P.P.U.

Types of Land	Area in acres	Average yield in lb per acre	Productivity rating per acre	Number of P.P.U.
Good quality lands(A)	20.28	2000	2.04	41.37
Medium quality lands(B	110.71	900	1.00	110.71
Poor quality lands (C)	23-33	..	..	....
Total	154.32	..	..	152.08

It will be seen from Table LXVIII that 154.32 acres of culthrable land of Bisayakpur kachhar give a total of 152 P.P.U. lies mainly in the conversion of poor quality land into the medium quality land which can only be possible by reclaiming the wasteland. If the producive capacity of these lands is increased, the production of the village will be increased and the village will be self sufficient in its produce.

LAND UTILIZATION IN AKBARPUR BIRBAL KACHHAR

Location

The village of Akbarpur Birbal[1] lies in the south-west of the Ghtampur tahsil of the Kanpur district at distances of 9 and 35 miles from the tahsil and the district headquarters respectively. It is situated in 26°4'N latitude and 80°7'E longitude. The village is surrounded by the villages of Gaurawa Tikri in the north and north-west, Makranpur in the south-west and Mau Nakhat in the east, while the river Yamuna forms the southern boundary of the village.

The river Yamuna has low sandy banks and it meanders from north to south-east at a distance of a few furlongs from the village. Along the south-eastern loop of the river, a narrow

(1) The village consists of two administrative units: Bangar and Kachhar. Bangar or upland lies with in the extensive ravines of the river Yamuna, while kachhar or low land stretches from the immediate vicinity of the river to the sloping lands among the ravines. The Writer has surveyed only the village of Akbarpur Birbal Kachhar.

strips of tarai land[1] stretches from the south to the north, which varies in extent from a few yards to a few furlangs. Above the ordinary waterline is a belt of level or gently sloping kachhar and above this lowland, a series of rugged ravines covered with low scrubs extends towards the north.

The continuous stretches of coarse sand[2] along the left bank of the river form a stricking feature of the physiography of the village, which are deposited by the river Yamuna during the dry season, when the river becomes confined to a narrow channel. The Writer has personally visited the area and marked that the patches of shrubs known as 'jhau' have sprung up in the sand at certain places. In th wet monsoon months, the river occupies the entire channel and often overflows its left bank inundating the 'tir' land lying close to the vicinity of the river.

The river, when in spate, carries large quantities of material of all sizes from loose coarse sand to fertile silt. When water flows round the stems of the jhau, its speed is checked at each plant and a little of the finer mud dropped there. The river, therefore, buries good loam several inches deep in barren sand. But the fertility of the soil varies from year to year depending upon the nature of the material brought by the river. It is, therefore, practically impossible to say what a field will look like after the next flood.

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(1) Locally this type of land is known as a 'Tir'.
(2) These stretches are formed due to the gradual washing out of the finer particles of soil by erosion and the piling up of the sand by the action of prevailing winds.

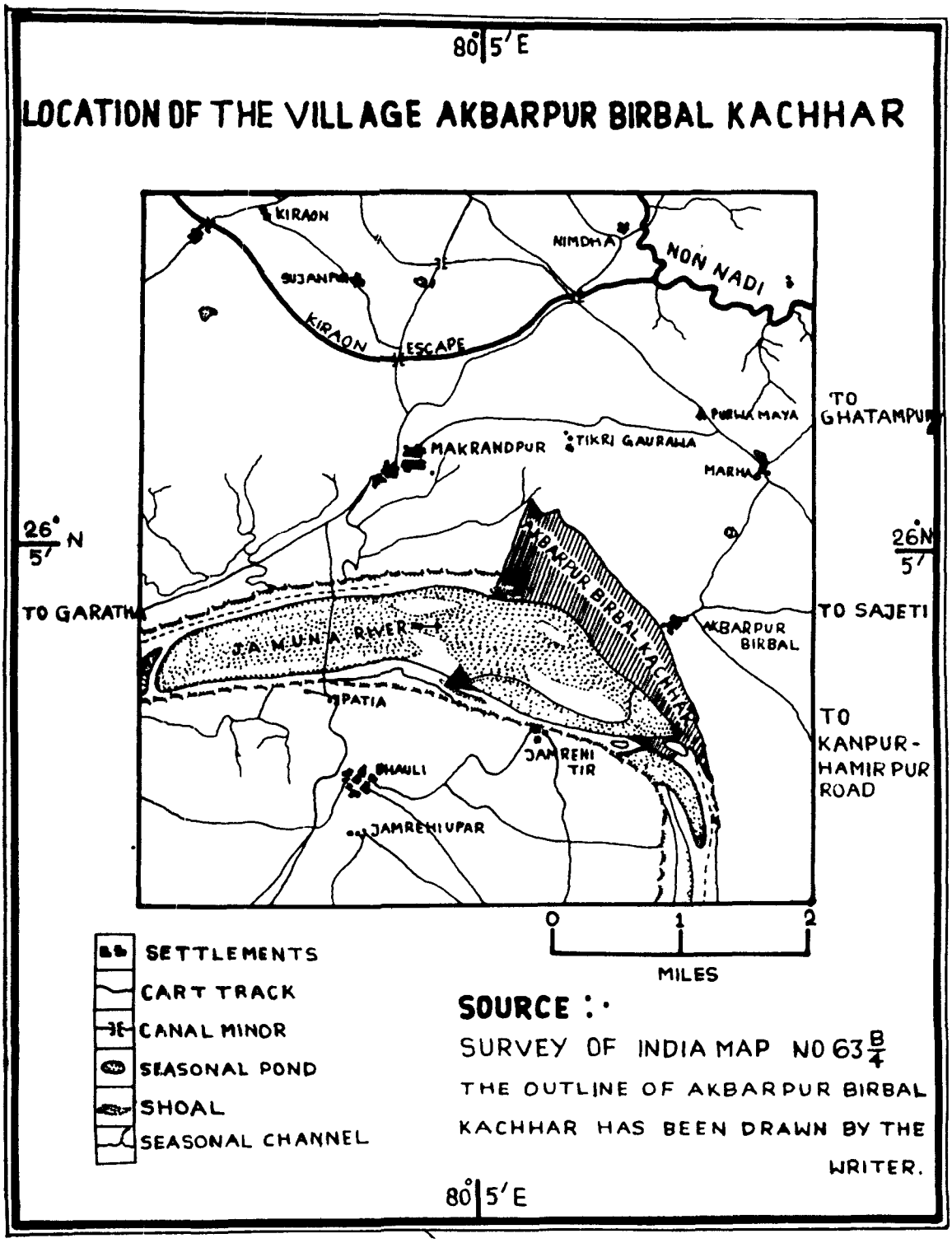

80° 5' E
LOCATION OF THE VILLAGE AKBARPUR BIRBAL KACHHAR
KIRAON
NIMDHA
NON NADI
SUJANPUR
KIRAON ESCAPE
TO GHATAMPUR
PUELIA MAYA
MAKRANDPUR
TIKRI GAURAHA
MARHA
26° 5' N
26° N 5'
TO GARATHA
AKBARPUR BIRBAL KACHHAR
TO SAJETI
JAMUNA RIVER
AKBARPUR BIRBAL
PATIA
TO KANPUR-HAMIRPUR ROAD
JAMRENI TIR
BHAULI
JAMRENI UPAR
0 1 2
MILES
SETTLEMENTS
CART TRACK
CANAL MINOR
SEASONAL POND
SHOAL
SEASONAL CHANNEL
SOURCE :-
SURVEY OF INDIA MAP NO 63 B/4
THE OUTLINE OF AKBARPUR BIRBAL KACHHAR HAS BEEN DRAWN BY THE WRITER.
80° 5' E

Fig. 87

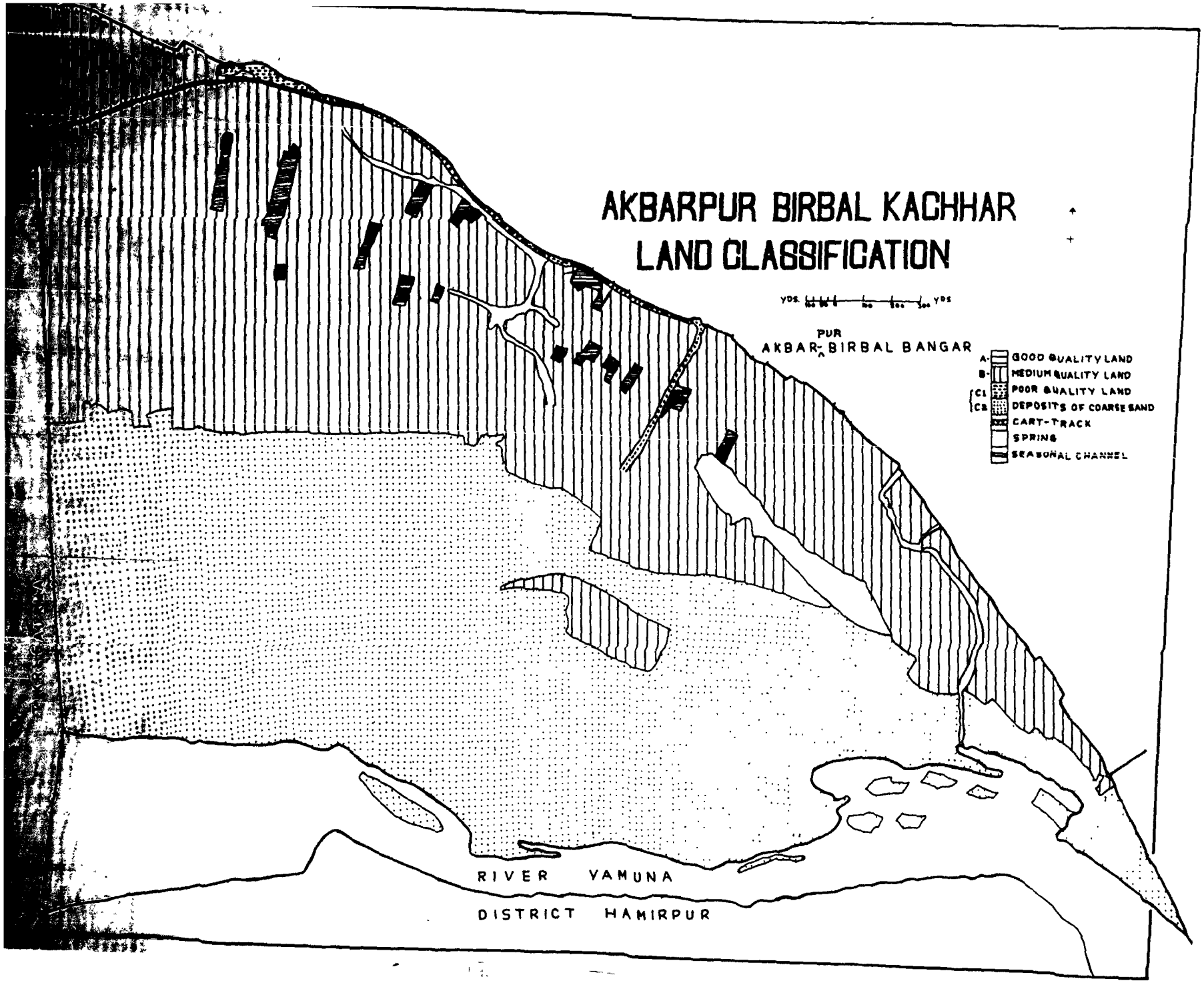
The village is accessible by a cart track, which runs through the heart of the village, joins the metalled road (from Kanpur to Hamirpur) at the town of Ghatampur, about 9 miles towards the east, while another cart track leads to the village of Sajeti, lying on the same metalled road, about 5 miles towards the east. The village has, therefore, an easy access to the markets of Ghatampur and Sajeti where market is held twice a week.(Fig. 87). But during the wet monsoon months, these cart tracks become muddy and almost impassable due to the presence of stiffy black clay or kabar soil, and this influences the time of marketing of agricultural products. The long distance from the important market of Ghatampur is also the second great handicap to the development of the village.

Climate

No climatic data are recorded in the village. The nearest rainfall recording station from the village is Ghatampur. The data of rainfall recorded at the tahsil headquarters of Ghatampur are indicative of the climatic conditions of the village and have, therefore, been given in Tables LV and LVI on pages 164-165 which have been given for the village of Kunwarpur.

Land Classification

The soil of the area in which the Kachhar is situated is mainly from sandy to sandy silt.(Fig.25) The village fields have been differentiated in Fig. 88 on the basis of fertility and productivity (See page 57). During the rains kachhar lands are for


AKBARPUR BIRBAL KACHHAR
LAND CLASSIFICATION
YDS.
YDS
AKBARPUR
BIRBAL BANGAR
A- GOOD QUALITY LAND
B- MEDIUM QUALITY LAND
C1 POOR QUALITY LAND
C2 DEPOSITS OF COARSE SAND
CART-TRACK
SPRING
SEASONAL CHANNEL
RIVER YAMUNA
DISTRICT HAMIRPUR

the most part actually under water. In these lands, then, either no kharif is sown or the coarsest crops as big millets and bulrush millet mixed with arhar(Cajanus indicus) are sown. Rabi, on the other hand, is a fairly secure crop. Thus the medium quality lands(B) are usually of temporary existence, and cover the most part of the village. The soil of these lands is silty sand, while the soil of the patches of good quality land is fine silt and capable of producing vegetables for the whole of the year.

The fertility of the soil depends upon the action of the river itself. The river changes the soil of the fields every year. Sometimes the river may bury good loam of high fertility several inches deep in barren sand. On the other hand, it may entirely leave stretches of loose coarse sand and these deposits of coarse sand may be categorized as the poor quality lands(C), which are rendered unproductive for the whole year, though they form a part of the culturable land of the village.

Irrigation

No irrigation is practised in the village. The question of watering the fields in the rabi season does not arise. Water is so near the surface and the subsoil is so porous that the crops are sufficiently supplied with moisture and even vegetables are not irrigated.

Land Utilization

The land utilization of the village in 1960-61 is mapped in Figs.89 to 91.[1] Table LXIX shows the present farms of

(1) The base map of the village showing the fields and their areas

land use.

Table LXIX

Total area of the village---1199.90 acres.

Use of land	Area in acres	Percentage of the totals area
Cultivated land[1]	558.27	46.52
Culturable Wasteland[2]	528.57	44.05
Road	4.46	0.37
Natural Water Features	108.60	9.05
Total	1199.90	100.00

It will be seen from the above Table that 46.5 per cent of the total land of the village is cultivated, 44 per cent is occupied by the stretches of loose coarse sand while 9 per cent of the total area is occupied by the river Yamuna itself. Settlement is entirely absent from the kachhar land as this area is usually

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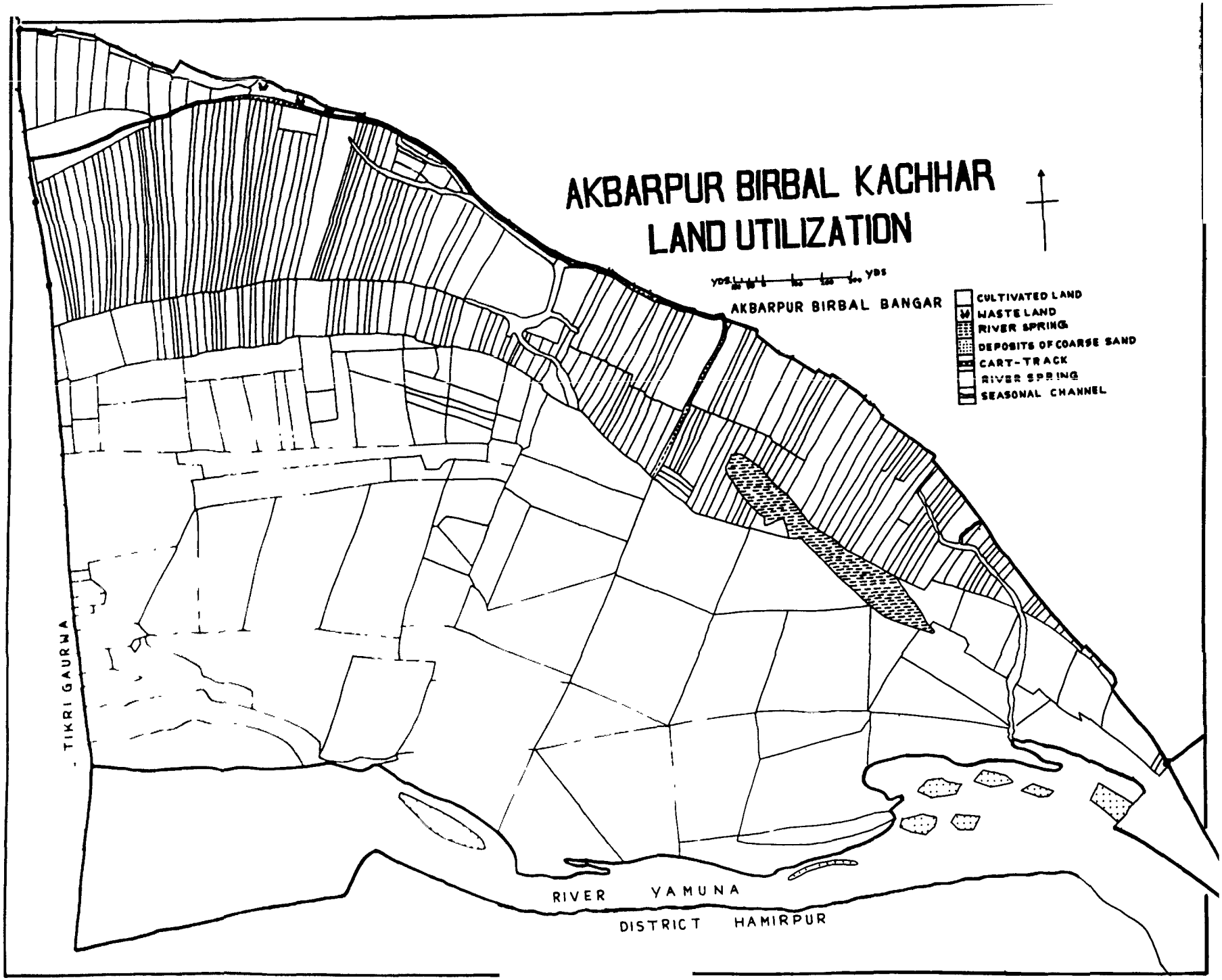
Contd...was obtained from the Lekhpal of the village concerned. The village was visited by the Writer in the kharif season of 1960 and in the rabi season of 1961 and the use to which each field was being put was recorded on the base map. From these data Figs. 80-91 were prepared.

(1) Cultivated land includes current fallow lands in the year of inquiry in the kharif and rabi seasons.

(2) Practically, there is no wasteland in the village except a few patches lying in he north-western extremity of the village. The acreage of these patches is only 1.77 acres. The land, which was actually under water in the kharif and could not utilized for the rabi crops also due to enormous deposits of gravels and coarse sand by the river Yamuna in the year of inquiry. Therefore such landhas been differentiated from the actual cultivated land of the year 1960-61 and has been classified as culturable wasteland. The proportion

Contd....2


AKBARPUR BIRBAL KACHHAR
LAND UTILIZATION
yds
yds
AKBARPUR BIRBAL BANGAR
CULTIVATED LAND
WASTE LAND
RIVER SPRING
DEPOSITS OF COARSE SAND
CART-TRACK
RIVER SPRING
SEASONAL CHANNEL
TIKRI GAURWA
RIVER YAMUNA
DISTRICT HAMIRPUR

unhealthy and the houses may be flooded or even completely washed away during the wet monspon months. The cultivators, therefore, live on the banger land of the village Akbarpur Birbal and come down to the kachhar to cultigate the fields.

A comparison of Figs. 88 and 89 shows a close relationship betweon the quality of the land and the size of the fields. The cultivated fields of the good and medium quality lands are usually small in size and rectangular or long and narrow in shape, while the plots of the poor quality lands occupied by the infertile mounds composed of coarse sand and gravels are relatively very large varying from 2 to morethan 20 acres in size and are mainly confinedto the southern fringe of the village along the river Yamuna. The following Table shows the size of fields in 1960-61.

Table LXX

Size of fields	Number of fields of each size	Percentage of the fields of each size to the total number of fields
Below 0.50 acre	87	21.5
Between 0.50 and 1.0 acre	82	20.3
1.0 acre to 2.0 acres	93	23.0
2.0 acre to 3.0 acres	58	14.3
3.0 acres to 4.0 acres	18	4.5
4.0 acres to 6.0 acres	11	2.7
6.0 acres to 8.0 acres	14	3.4
10.0 acres to 20.0 acres	30	7.4
over 20.0 acres	11	2.7
Total	404	100.00

Contd..of the culturable wasteland varies from yeat to year as it has been discussed in the foregoing pages that the deposition of sand, sand silt and loose coarse sand is entirely depends upon the action of the riwer Yamuna.

Table LXX shows that about 42 per cent of the fields are below 1 acre in size and 58 per cent of the fields vary between 1 to 20 acres in size. It shows that the size of the fields, of this village is comparatively larger then that of the other villages. 30 fields vary between 10 and 20 acres in size, while 11 fields are over 20 acres in size. The fields of the larger sizes are unutilised and may be regarded as wasteland for the year 1960-61 as they contain the deposits of loose coarse sand.

Land Utilisation in the Kharif Season

Fig. 90 illustrates the use of land in the kharif season of 1960. The area occupied by each crop in this season is shown in Table LXXI.

Table LXXI

Gross cultivated area 558.27 acres
Net cropped area in the kharif season 17.42 acres

Crops	Acreage under different crops	Percentage of gross cultivated area	Percentage of net cropped area	Total percentage of gross cultivated land	Total percentage of net cropped land
GRAIN CROPS:				2.08	66.71
Bulrush millet	7.72	1.38	44.32		
Bulrush millet and pulses	3.90	0.70	22.39		
Vegetables	5.80	1.04	33.29	1.04	33.29
Fallow	540.85	96.88	**	96.88	***
Total	558.27	100.00	100.00	100.00	100.00

It will be seen from the above Table that only 3 per cent of the gross cultivated land is devoted to the kharif

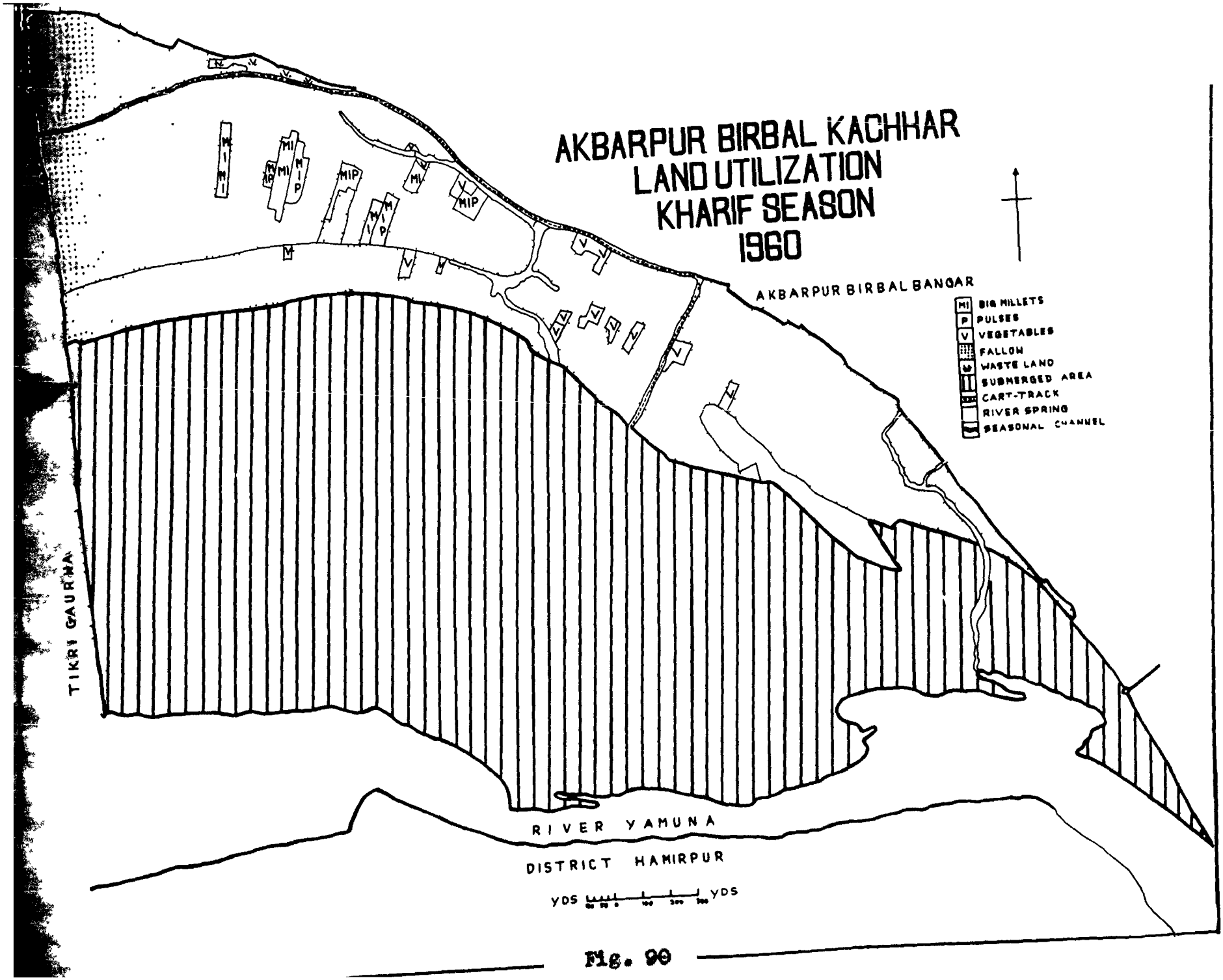

AKBARPUR BIRBAL KACHHAR
LAND UTILIZATION
KHARIF SEASON
1960
AKBARPUR BIRBAL BANGAR
BIG MILLETS
PULSES
VEGETABLES
FALLOW
WASTE LAND
SUBMERGED AREA
CART-TRACK
RIVER SPRING
SEASONAL CHANNEL
TIKRI GAURWA
RIVER YAMUNA
DISTRICT HAMIRPUR
YDS
YDS

Fig. 90

crops and about 97 per cent of the gross cultivated land is left fallow for these lands are actually under water and yield only rabi crops, provided they become dry during the rabi season. 11.62 acres or two-thirds of the net cropped area is occuped by the grain crops in the kharif season. Bulrush millet, either, sown as a sole, or mixed with Arhar, is the principal crop. Vegetables are extensively grown in the higher pathees of sandy soils and cover another one-third of the net cultivated area. Although physical facters, such as, sandy soil, adequate water supply etc., are well suited to the cultivation of vegetables in the village, yet social and economic facters seem to stand in the way of growing vegetables. If these obstacks are removed, the area under vegetables can be increased and the villagers can get extra cash from selling these vegetables in the neighbouring markets.

Land Utilization in the Rabi Season

The use of land in the rabi season of 1960-61 is illustrated in Fig. 91. The area occupied by each crops in the season is shown in the Table LXXII.

Table LXXII indicates that over 97 per cent of the net cropped land in the rabi season is occupied by the grain crops. Wheat, either sown as a sole, or, mixed with gram is the major crop. Wheat itself occupied about 57 per cent of the net cropped land and another 13 per cent of the net cropped land is covered by wheat and gram. Wheat is mainly grown on the fertile silt deposited by the river Yamuna, where flood water has spread out over a wide stretch of land lying in the central west of the village(Fig.91). Barley and Gram

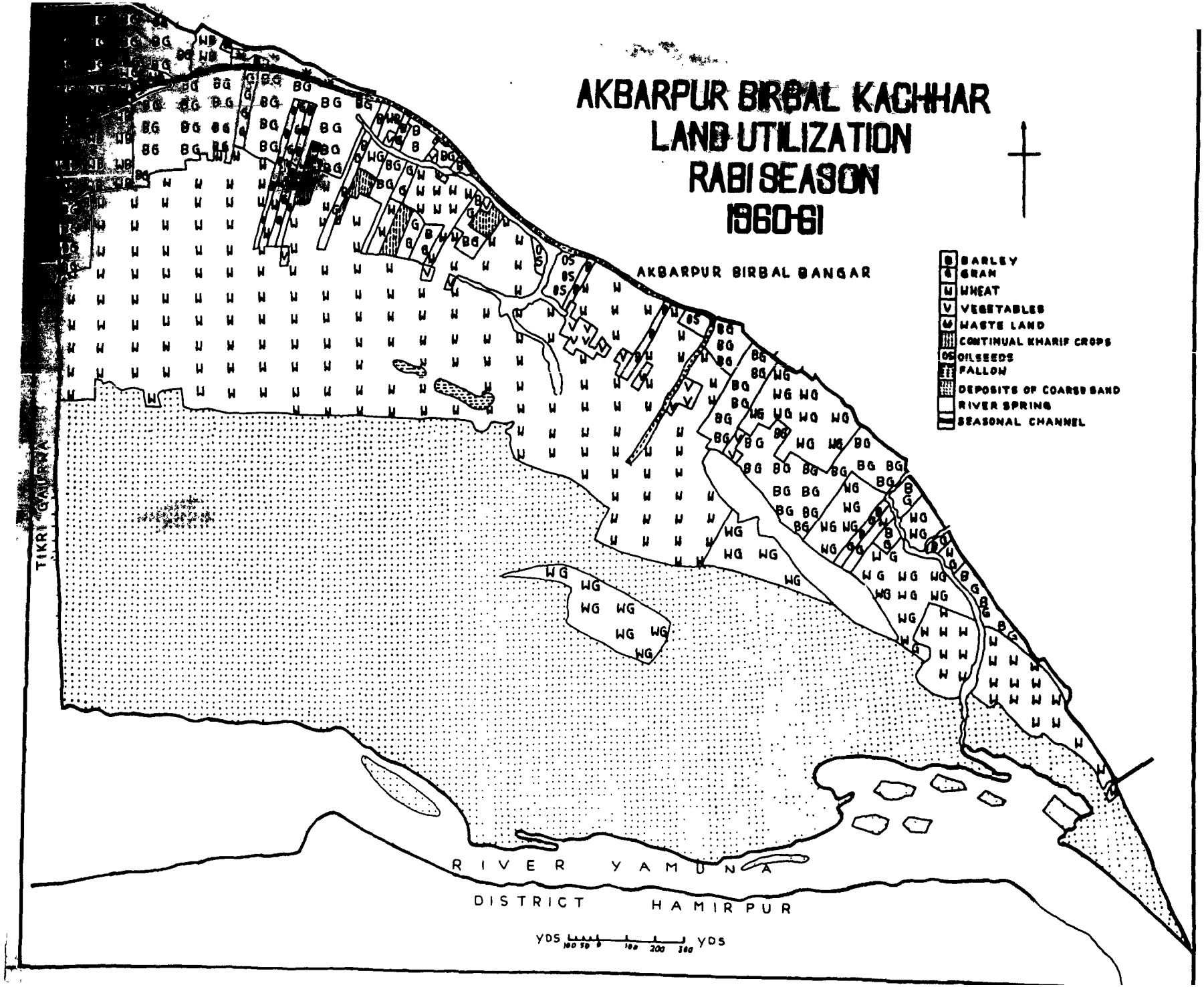
is the next important crop, which covers about one-fifth of the net cropped area. Crops mixed with barley and gram and wheat and gram are confined to the north-east of the village.

Table LXXII

Gross cultivated area [illegible] acres
Net cropped land in the Rabi Season 550.60 acres

Crops	Area in acres	Percentage of gross cultivated land	Percentage of net cropped land	Total percentage of gross cultivated land	Total Percentage of net cropped land
GRAIN CROPS:-				96.32	97.66
Wheat	313.70	56.19	56.96		
Wheat & Gram	75.13	13.44	13.65		
Gram & Barley	111.45	19.97	20.24		
Wheat & Barley	15.42	2.76	2.80		
Barley	14.41	2.58	2.61		
Gram	7.71	1.38	1.40		
OTHER CROPS:-				1.30	2.34
Oilseeds	6.89	1.24	1.25		
Vegetables	5.89	1.06	1.08		
Continual kharif crops	3.90	0.70	..	0.70	...
Fallow	3.77	0.68	..	0.68	...
Total	558.27	100.00	100.00	100.00	100.00

The above Table further shows that the mixed cropping is an important feature in this village. The main cereals Wheat and barley are mixed with gram, as the gram maintains the supply of nitrogen in a convenient way on very small holdings and also encourages bacterial action in the soil.


AKBARPUR BIRBAL KACHHAR
LAND UTILIZATION
RABI SEASON
1960-61
AKBARPUR BIRBAL BANGAR
BARLEY
GRAM
WHEAT
VEGETABLES
WASTE LAND
CONTINUAL KHARIF CROPS
OILSEEDS
FALLOW
DEPOSITS OF COARSE SAND
RIVER SPRING
SEASONAL CHANNEL
TIKRI GAURWA
RIVER YAMUNA
DISTRICT HAMIRPUR
YDS
YDS

Besides cereals, oilseeds(linseed and mustard) and vegetables are also grown in the village. Oilseeds are grown on light soils in the sandy ridges, while vegetables usually are grown on sandy soils along the coarse of the river Yamuna. They are generally sold in the markets of Sajeti.

Double Cropped Land

The area cropped twice in the year was 9.75 acres or 1.75 per cent of the gross cultivated land, which constitutes a negligible proportion of the arable land. This low percentage indicates that double cropping is not possible every where owing to the wetness of the lowlands, which are actually under water during the kharif season. Double cropping is only confined to good quality lands, which are devoted to the vegetables.

Land Use and Population

The totals of various classes of lands as well as the percapita share of the villagers in them have been mentioned in the follwing Table:-

Table LXXIII

Total number of persons[1], depnding upon the produce of the village ---796

(1) Data based upon the personal survey, collected during the course of the field work. It has been discussed in the fore going pages that the village is unpopulated and the people of Akbarpur Birbal Bangar come down to cultivate the fields of Kachhar.

	Total area of the village	Totalava-ilable land for cultiva-tion	Net cropp-ed land in the kharif season	Net cropp-ed land in the rabi season	Total cul-tivated land(both of kharif and rabi	Double cropped land
Area (in inches	1199.90	558.27	17.42	550.60	568.02	9.75
Land per head of populati on	1.51	0.70	0.02	0.69	0.71	0.01

The above Table shows that the per capita cultivated land available in the village is 0.70 acre, but in the kharif season the per capita net cropped land is reduced to a very small amount of 0.02 acre only, as the cultivated fields are under water and are not available for kharif crops, while the per capita net cropped land in the rabi season is 0.69 acre, as almost the whole of the cultivated land except a few fields, is devoted to rabi crops.

The above Table further shows that the per capita double-croppedland in the village is only 0.01 acre and thus the per capita total cultivated land is 0.71 acre. In other words, the amount of land supporting one person in Akbarpur Birbal Kachhar is 0.71 acre.

As far as the occupational structure of the population is concerned, all the 79% persons of Akbarpur Birbal Bangar belong to the primary rural group and depend directly upon the produce of the village. The question of the secondary rural population does not arise.

It may be pointed out that the living standard of the people in the village is below the average. Per capita gross cultivated land is only 0.71 acres, which is not sufficient for the requirements. The following Table gives the idea of Potential Productive Units (P.P.U.) of different types of land.

Table LXXIV

Average yield per acre of good farm land

1230 lb = 1,P.P.U.

Types of land	Area in acres	Average yield in lb. per acre	Productivity rating per acre	Number of P.P.U.
Good quality lands(A)	9.76	1940	1.6	15.60
Medium quality lands(B)	548.52	1230	1.0	548 .52
Poor quality lands(C)	528.57	..	..	...
Total	1086.84			564.10

The above Table reveals that 1086.84 acres of culturable land give a total of 564 P.P.U. 528.57 acres of poor quality lands is unutilized as these are with in the fluvial action of the river Yamuna during the kharif season. The construction of embankment to save the lands from floods proves ineffective when the river is in spate. In the rabi season, these lands are also

covered with the enormous deposits of coarse sand brought by the river Yamuna. It may be pointed out that the productive capacity of the land depends to a great extent upon the action of the river. It is suggested, therefore, that the productive capacity of the village may be raised by increasing the acreage of medium quality land and by up grading the medium quality land to the good quality land.

LAND UTILIZATION IN BAIJAMAU KACHHAR[1]

Location

The village of Baijamau lies in the south-west of the Bhognipur tahsil at a distanc of 24 miles from Pokhrayan, the headquarters of tahsil Bhognipur and 63 miles from the headquarters of the Kanpur district. It is situated in $26^{0}17'$N latitude and $79^{0}33'$E longitude. Located among the raviny area of undulated heights,[2] it is bounded by the villages of Arsun in the north and north-west, Mahdeva and Jasalpur in the east, while its southern and western boundaries

(1) There are two villages of Baijamau, distinguished physically as Bangar and Kachhar by the Revenue Department. The Writer has conducte only the survey of the village of Baijamau kachhar, which is unpopulated. The peasants of Baijamau Bangar usually cultivate the entire kachhar lands of foresaid administrative unit. Therefore, the Writer has mentioned here the location and accessbbility of land for the whole village.

(2) The ravines of the river Yamuna are of vast size rising to a height of above fifty to sixty feet above the river.

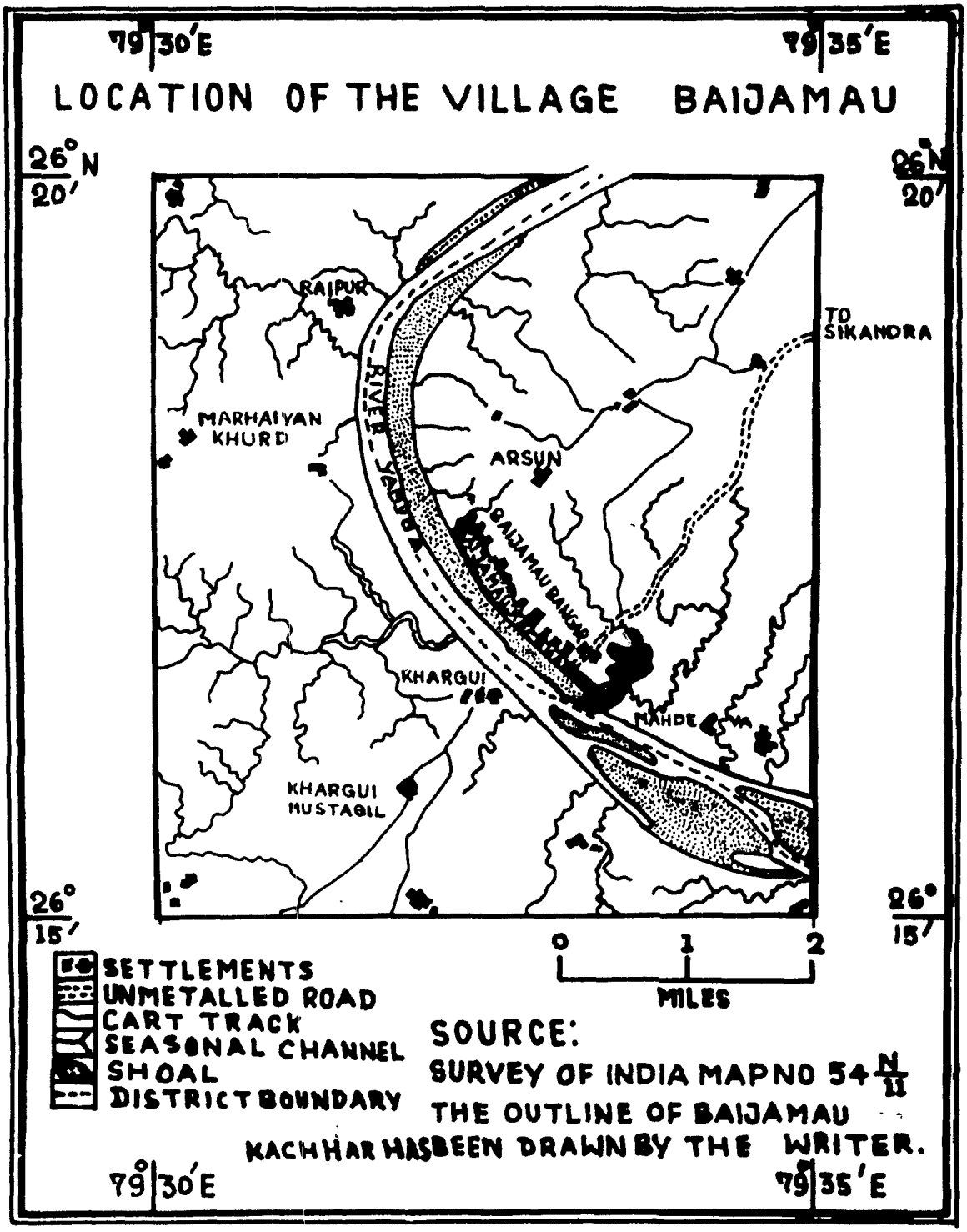

79° 30'E
79° 35'E
LOCATION OF THE VILLAGE BAIJAMAU
26° 20' N
26° 15'
RAIPUR
TO SIKANDRA
MARHAIYAN KHURD
ARSUN
BAIJAMAU BANGAR
KHARGUI
MAHDEVA
KHARGUI MUSTAGIL
0 1 2
MILES
SETTLEMENTS
UNMETALLED ROAD
CART TRACK
SEASONAL CHANNEL
SHOAL
DISTRICT BOUNDARY
SOURCE:
SURVEY OF INDIA MAP NO 54 N/11
THE OUTLINE OF BAIJAMAU KACHHAR HAS BEEN DRAWN BY THE WRITER.

Fig. 92

are formed by the river Yamuna and a seasonal channel respectively (Fig. 92). The land of Baijamau Kachhar physically can be distinguished into two types:

1) Tarai of the river Yamuna: The land[1] lies in the lowest levels just close to the river Yamuna and is a narrow alluvial fringe of recent deposits liable to annual fluctuations.

2) The Kachhar: The broad uneven stretch of kachhar lies above the ordinary waterline and the belt is of permanent character, but subject to occasional inundation. Above this kachhar extends a series of rugged ravines.

The long distance from the markets is one of the great handicaps to the development of this village. There is an unmetalled road,[2] which runs in a zigzag coarse through the village to the north east and joins the old Mughal road(Agra to Allahabad) at Sikandra about seven miles towards the north of the village(Fig.92). The Mughal road leads to Rajpur about 9 miles to the north-east of the village. The village has, therefore, an easy access to the markets of Sikandra and Rajpur, where market is held twice a week. But in the rainy season, the extensive ravines make communication difficult.

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(1) The 'Tir' or 'Tarai' land is locally known as 'Bisua'

(2) The road has its outstanding importance, as it is the main connecting link of the two great rivers Ganga and Yamuna. The road runs from Naramau ferry on the Ganga and passing through the village of Bilhaur, Kakwan, Rasulabad, Mangalpur and Sikandra which ultimately terminates at Baijamau ferry on the river Yamuna.

The river Yamuna forms an important artery for transportation. The same unmetalled road, which runs through the village crosses the river Yamuna in the south by means of a ferry service, and leads to the village khargui in the Jalaun district. The ferry service is often suspended during the wet monsoon months, but this ferry service is the connecting link between the Kanpur and Jalaun districts.

Climate

No climatic data are recorded in the village. The data of rainfall recorded at Pukhrayan the headquarters of tahsil Bhognipur, about 24 miles to the north-east of the village may be treated as indicative of rainfall for Baijamau kachhar, which have been given in the Tables XXV and XXVI on pages 112-113 for the village of Pitakpur.

Land Classification

An attempt has been made to classify[1] the village fields in Fig. 93 according to the fertility and productivity (see page 57). The distinguishing feature of the kachhar lands is their wetness, for during the rains they are for the most part under water. In the kharif season, therefore, the village is reduced to a

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(1) A permanent type of land classification can not be assessed for the village of Baijamau kachhar, as the entire land of the village is assessed temporarily for the term of only 5 years. Fields have also no permanency and stability due to the different natures of the soil deposited by the river Yamuna from year to year.

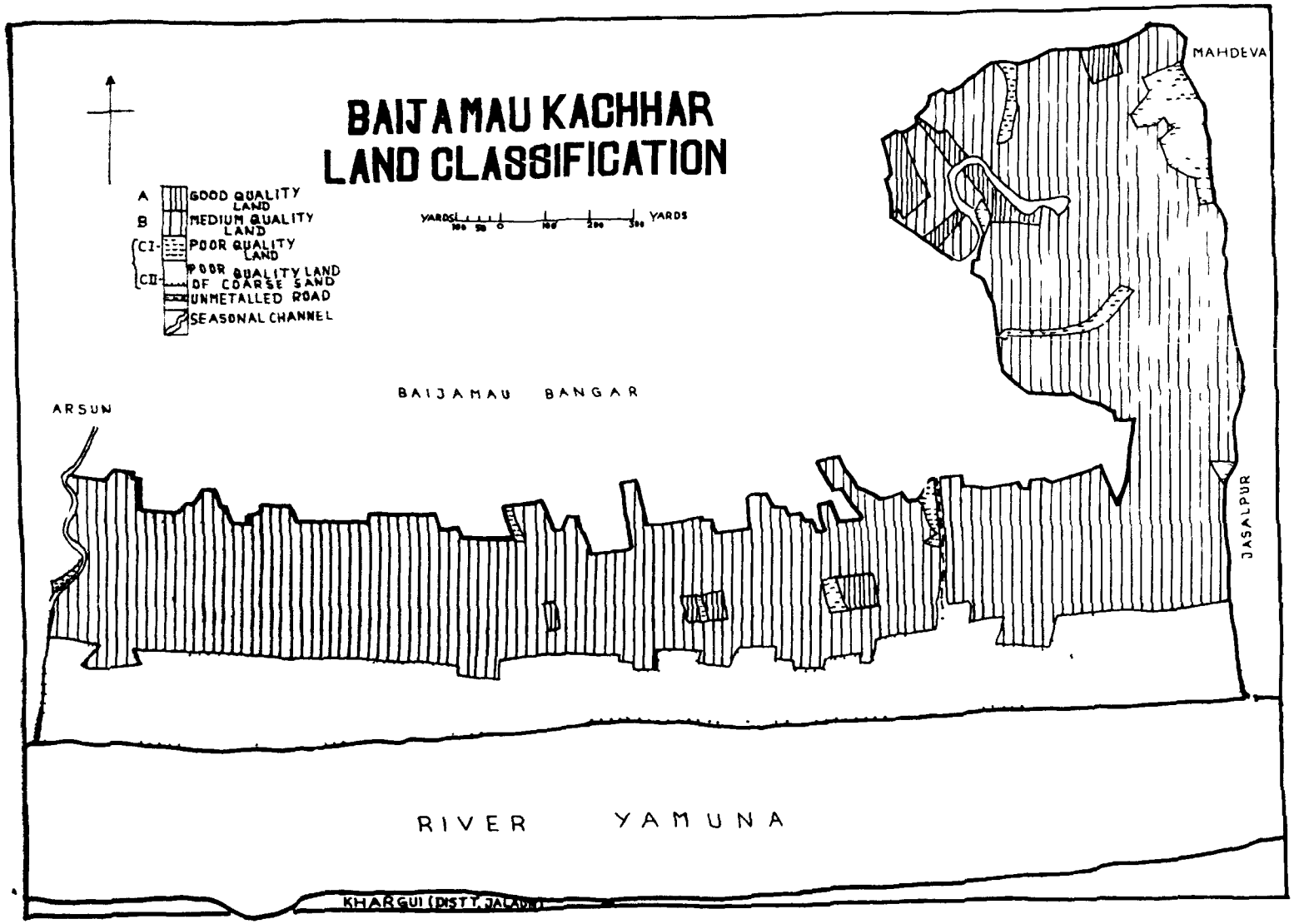
BAIJAMAU KACHHAR
LAND CLASSIFICATION
A GOOD QUALITY LAND
B MEDIUM QUALITY LAND
CI POOR QUALITY LAND
CII POOR QUALITY LAND OF COARSE SAND
UNMETALLED ROAD
SEASONAL CHANNEL
YARDS 300 200 100 0 100 200 300 YARDS
MAHDEVA
BAIJAMAU BANGAR
ARSUN
JASALPUR
RIVER YAMUNA
KHARGUI (DIST. JALAUN)

Fig. 93

minimum. The coarse crops such as big millets and bulrush millets are sown. The soil of the good quality lands is sandy silt and the lands produce vegetables or yield two crops a year. The medium quality lands(B) consist of sandy or silty sand soil and are capable of producing only rabi crops. Like the soil of Akbarpur Birbal Kachhar its fertility varies from year to year, depending upon the action of the river itself. Sometimes the river may cut a wide channel through a block of fertile fields and sometimes may bury good loam several inches deep in barren sand. On the other hand, it may deposit fertile silt. The stretches of loose coarse sand are rendered unprodctuve, but these patches are also not of permanent character and some times they are coated with veneer of silt or loam, and these patches are devoted to a few rabi crops.

Irrigation

Like all the other villages of kachhar lands, Bijamau kachhar is also not benefited the facilities of irrigation. The question does not arise for watering in the kharif season and in the rabi season also the crops do not require water due to the nature of the soil. The subsoil is so porous that the crops are sufficiently supplied with moisture even in the driest months. Besides rabi crops are sown in some fields very late, sometimes in the month of November as these fields are underwater even upto the month of October.

Land Utilization

The land use of the village in 1960-61 is represented in Figs. 94 to 97.[1]

(1) The base map showing the fields and their areas was obtained from

Contd....2

Table LXXV gives a summary of the proportions of the village lands devoted to various uses in 1960-61(Fig. 94).

Table LXXV

Total area of the village-415.03 acres

Use of Land	Area in acres	Percentage of the total area
Cultivated land	218.69	52.68
Wasteland	8.83	2.13
Grove	0.33	0.08
Road	0.13	0.03
Water features[2]	187.05	45.07
Total	415.03	100.00

It will be seen from the above Table that nearly 53 per cent of the total land of the village was cultivated[2] in the year of inquiry, 2 per cent is unproductive, while about 45 per cent of the total area was occupied by either the river Yamuna itself, or those fields of the tiror biswas which were submerged by the river

Contd.. the Lekhpal of the village concerned. Baijamau kachhar was visit by the Writer in the kharif season of 1960 and the rabi season of 1961, and the use to which each field was being put was recorded on the base map. From these data Figs. 94 to 97 were prepared.

2)It has been discussed inthe foregoing pages that the cultivated land is variable from year to year as it depends upon the recent alluvium or fertile silt brought and deposited by the river Yamuna and if a land is fit for cultivation the crop is taken from it.

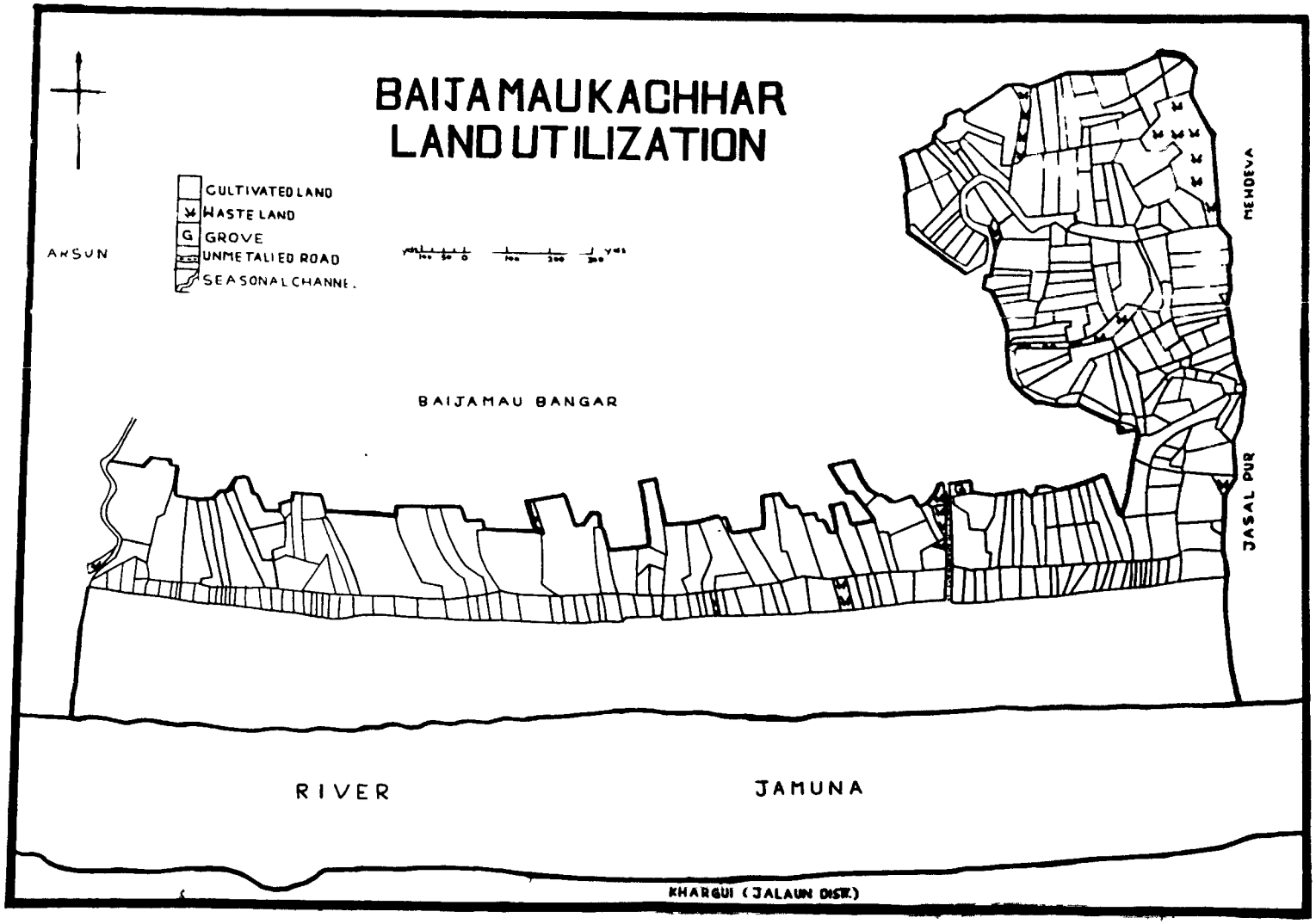
BAIJAMAUKACHHAR
LAND UTILIZATION
CULTIVATED LAND
WASTE LAND
GROVE
UNMETALLED ROAD
SEASONAL CHANNEL
AKSUN
BAIJAMAU BANGAR
MEHDEVA
JASAL PUR
RIVER
JAMUNA
KHARGUI (JALAUN DIST.)

Fig. 94

for the whole of that particular year. These lads were entirely beyond the reach of the farmer for cultivation.

Settlement is entirely absent from the Kachhar area, as this area is usually unhealthy and the houses may be flooded or even washed away completely during the wet monsoon months. The cultivators, therefore, usually live on the Bangar land of the village concerned and come down to the kachhar to till the fields.

A comparison of Figs. 93 and 94 reveals the influence of the quality of land on the size of the fields. Mostly the fields of good and medium quality lands are comparatively small, while these of the poor quality lands containing the loose coarse of sand are large. The following Table will show the size of the fields in 1960-61.

Table LXXVI

Size of fields	Number of fields of each size	Percentage of the fields of each size to the total number of plots.
Below 0.50 acre	165	53.7
0.50 acre to 1.0 acre	83	27.0
1.0 acre to 2.0 acres	49	16.0
2.0 acres to 3.0 acres	4	1.3
over 3 acres	6	2.0
Total	307	100.00

Table LXXVI shows that about 81 per cent fields are below 1.0 acre in size, of which 54 per cent fields are very small in size, they are below 0.50 acre, 16 per cent fields vary between 1.0 and 2.0 acres, while only 10 fields are over 2 acres which are mostly confined to the close of the bank of the river Yamuna(Fig.94).

Land Utilization in the Kharif Season

The use of land in the kharif of 1969 is mapped in Fig. 95. The area occupied by each crop is shown in the following Table.

Table LXXVII

Gross cultivated area 218.69 acres
Net cropped area in the kharif season 7.12 acres

Crops	Area in acres	Percentage of gross cultivated area	Percentage of net cropped area
GRAIN CROPS :-			
Small millets(Kakum)	4.08	1.87	57.31
Sawan	0.71	0.32	9.97
Maize	0.50	0.23	7.02
OTHER CROPS:-			
Vegetables	1.83	0.84	25.70
Fallow	211.57	96.74	..
Total	218.69	100.00	100.00

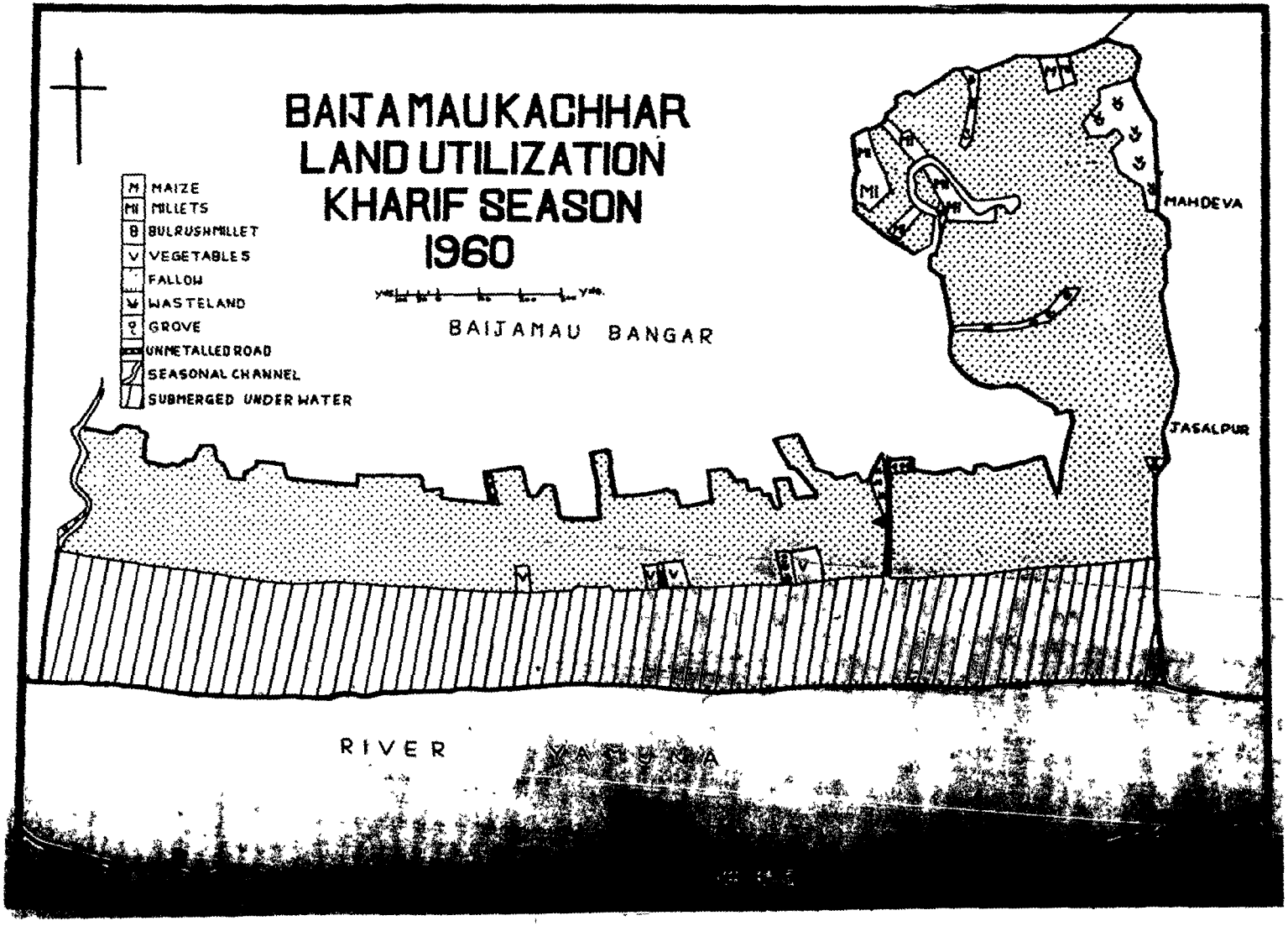
BAIJAMAU KACHHAR
LAND UTILIZATION
KHARIF SEASON
1960
M MAIZE
Mi MILLETS
B BULRUSH MILLET
V VEGETABLES
FALLOW
W WASTELAND
G GROVE
UNMETALLED ROAD
SEASONAL CHANNEL
SUBMERGED UNDER WATER
BAIJAMAU BANGAR
MAHDEVA
JASALPUR
RIVER

Fig. 95

The above Table reveals the fact that only 7 acres of the arable land are devoted to the kharif crops and this small acreage consititutes only 3 per cent of the gross cultivated area. Kakun is the major crop and accounts for itself about 57 per cent of the net cultivated land. It is sown usually in the north-east of the village close to the bargar land on highly manaured fields, as these fields lie near the 'Basti' (settled area) and receive an adequate supply of plant food enriched by the night soil, house refuse. It ripens in September giving about 240 lb. of grain to the acre. It is a popular food, especially for the poor and like bajara (bulrush millet) it is considered to be heating.

Other kharif crops are sawan and maize. Vegetables cover about one-fourth of the net cultivated land and are devoted to the good quality lands with sandy or sandy silt soils. But accessibility of the village to the markets is a great draw back in the production of vegetables, other wise, the acreage under vegetables can be extended and the villagers can get extra cash from selling vegetables in the neighbouring markets.

About 97 per cent of the gross cultivated land is left fallow in the kharif season,,as these lands are under water. Thus, they are capable of producing one crop a year.

Land Utilization in the Rabi Season

The useof land in the rabi seasonof 1960-61 is mapped in Fig. 96. The area occuped by each crop in this season

has been given in the following Table.

Table LXXVIII

Gross cultivated area 218.69 acres
Net cropped area in the rabi season 218.11 acres

Crops	Area in acres	Percentage of gross cultivated area	Percentage of net cropped area	Total percentage of gross cultigated land	Total percentage of net cropped land
GRAIN CROPS:				94.64	94.87
Barley & Gram	109.92	50.27	50.39		
Wheat & Gram	80.76	36.93	37.03		
Wheat	11.32	5.18	5.19		
Wheat & Barley	3.80	1.74	1.74		
Gram	1.14	0.52	0.52		
OTHER CROPS :				5.11	5.13
Oil Seeds	8.89	4.07	4.08		
Vegetables	2.28	1.04	1.05		
Fallow	0.58	0.25	..	0.25	..
Total	218.69	100.00	100.00	100.00	100.00

It will be seen from the above Table that the major crop in the rabi season is gram mixed with barley, which occupies 50 per cent of the net cropped area, while gram mixed with wheat occupies another 37 per cent. The preponderance of gram in the rabi crops shows the influence of soil on the distribution of crops. Gram can grow well with only a small moisture supply and a little tillage. The moisture retained in the soil after a regular wet monsoon

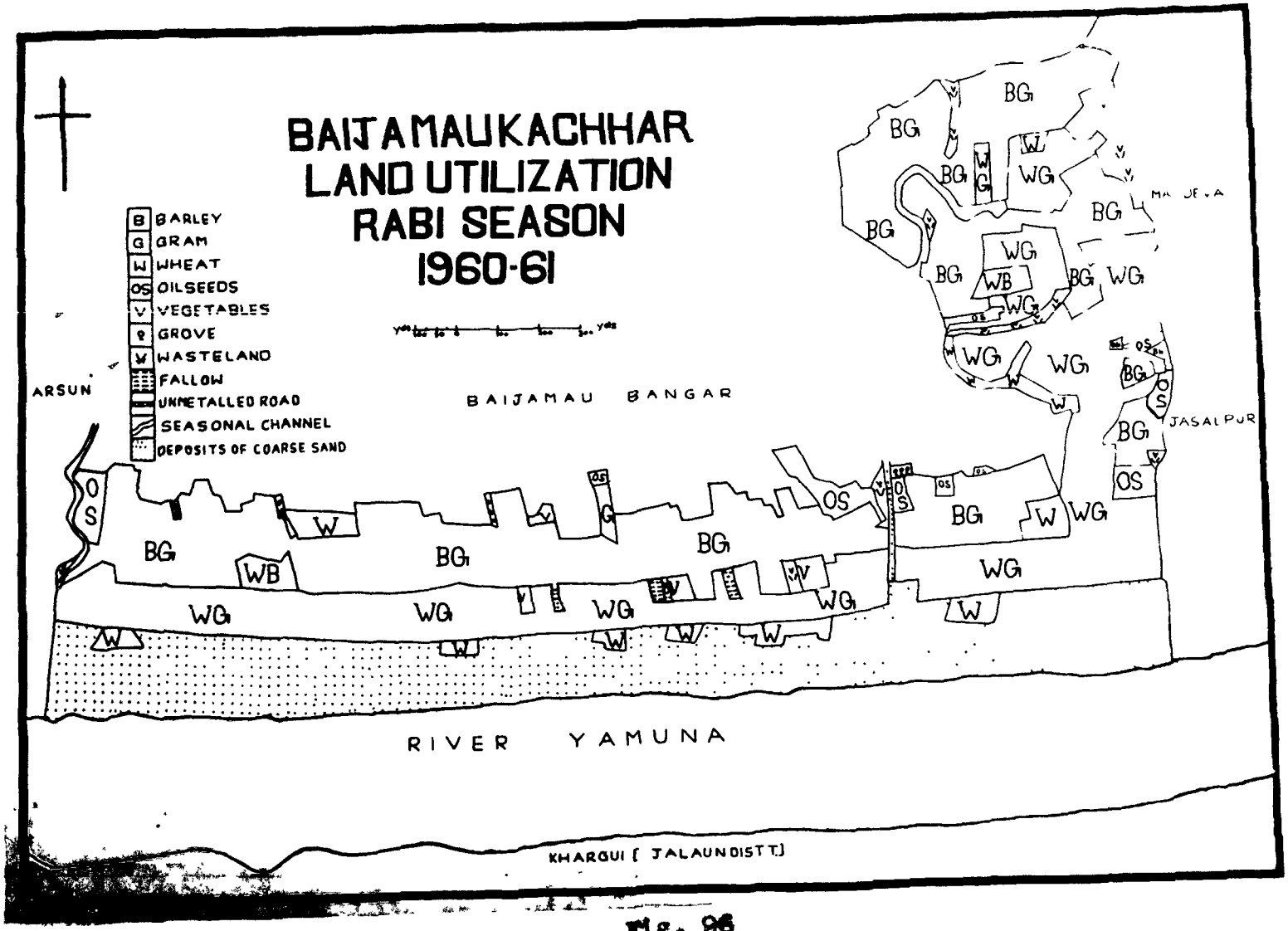
BAITAMAUKACHHAR
LAND UTILIZATION
RABI SEASON
1960-61
B BARLEY
G GRAM
W WHEAT
OS OILSEEDS
V VEGETABLES
P GROVE
K WASTELAND
FALLOW
UNMETALLED ROAD
SEASONAL CHANNEL
DEPOSITS OF COARSE SAND
ARSUN
BAIJAMAU BANGAR
JASALPUR
RIVER YAMUNA
KHARGUI (JALAUN DIST T.)

Fig. 96

is adequate for its growth. Besides, this, the air in the soil is more important factor than the presence of moisture. Gram is not only an important source of food for the villagers, but by the use of its mixture to other crops, it is possible also to keep up thesupply of combined nitrogen an small holdings. Being a deep rooted leguminous crop, it improves the land and before it is reeped it adds organic matter to the soil in the form of fallen leaves. Its dried stems and leaves are used as fodder.

From Fig. 96 it appears that gram mixed with barley is grown in a long narrow fringe stretching from east to west, and lying above the ordinary water line, where the river keeps close to the high bank, while a crop mixed with wheat and gram and wheat sown as a sole crop are grown usually in the patches of low strip of tarai, which contain silt of good fertility.

Wheat mixed with barley covers only 1.74 per cent of the net cultivated land and has its insignificant position among the rabi crops.

Apart from the food cereals, oil seeds and vegetables are also grown. The former occupies the higher sandy patches of light soil and is grown as a sole crop,[1] and it is the main source of income of the villagers. The linseed also helps the villagers in increasing the supply of dairy produce. The seeds provide oil for cooking while the oil cake is a valuable cattlefodder vegetables

(1) Generally linseed is sown with barley, gram and wheat in rows.

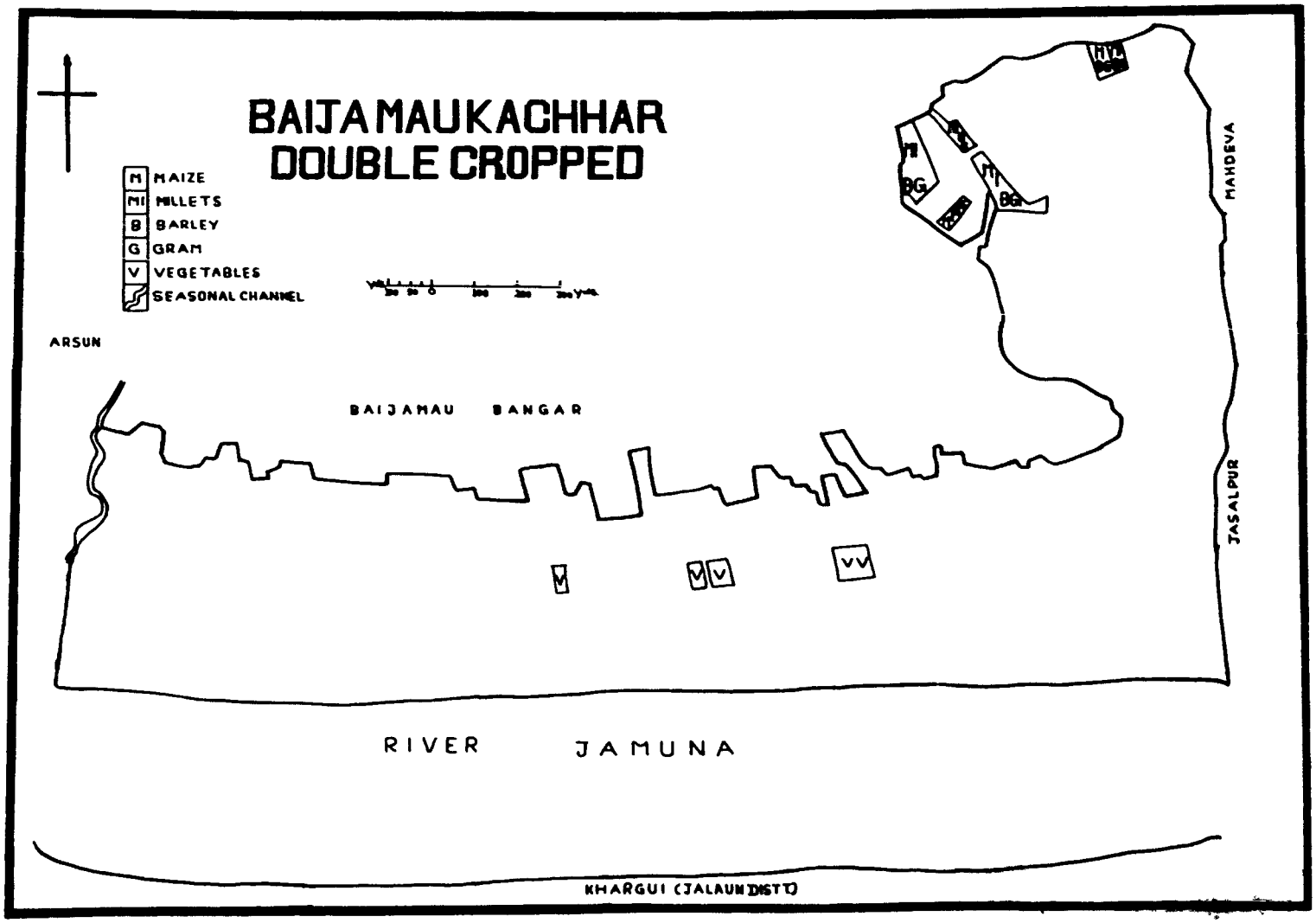
BAIJAMAU KACHHAR
DOUBLE CROPPED
M MAIZE
MI MILLETS
B BARLEY
G GRAM
V VEGETABLES
SEASONAL CHANNEL
ARSUN
BAIJAMAU BANGAR
MAHDEVA
JASALPUR
RIVER JAMUNA
KHARGUI (JALAUN DIST.)

Fig. 97

are grown on the good quality lands in the middle of the village (Fig.96) and also provide cash for the villagers.

Double Cropped Land

The total of the land cropped twice in the year was 6154 acres or about 2.99 per cent of the gross cultivated land. It will be seen from a comparison of Figs. 93 and 97 that double cropped area is mainly confined to the good quality lands, as some of fields are devoted to vegetables, which occupy the fields for almost the whole of the year. The area under double cropping is minimised, for during the rains, lowlands are for the most part, either swamps, or, actually under water. Therfore, kharif crops are impossible and soils of these fields yield only a rabi crop in a year.

Land use and Population

The following Table shows the various categories of lands in the village and per capita share of the villagers in these lands.

Table LXXIX
Total number of persons depending upon the produce of the village 252

	Total area of the village	Total available land for cultivation	Net cropped in the kharif season	Net cropped land in the rabi season	Total cultivated land (both of kharif & rabi	Double cropped land
Area in acres	415.03	218.69	7.12	218.11	225.23	6.54
Land per head of Population	1.65	0.87	0.03	0.86	0.89	0.02

Table LXXIX shows that the per capita cultivated land available in the village is 0.87 acre. Owing to non-availability of the fields which are submerged by the river Yamuna in the kharif season, the per capita net cropped land is minimised to a very small acreage of 0.03, while in the rabi the per capita net cropped land in the rabi season is 0.86 acre.

Table LXXIX further shows that the per capita double cropped land in the village is 0.02 acre and thus the per capita total cultivated land is 0.89 acre. In other words, the amount of land supporting one person is 0.89 acre in Baijamau Kachhar.

In case of this village 252[1] persons of Baijamau Bangar, who cultivate the fields of this village, directly depend upon the produce of the village and belong to the primary rural group. Thus agriculture is only the occupation of the people.

It may be pointed out that the living standard of the people in the village, as observed by the Writer, are similar to those of Bisayakpur and relatively lower as compared to those of people in well drained villages. Generally, the fields belong to the medium quality lands and are capable of producing only one crop a year and their productive capacity is relatively low. Table LXXX shows the relative productive capacity of the various types of lands in the village in terms of P.P.U.

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1) Data based upon the personal survey of the Writer.

Table LXXX

Average yield per acre of good farm land
900 lb. = 1 P.P.U.

Types of land	Area in acres	Average yield in lb per acre	Productivity rating per acre	Number of P.P.U.
Good quality lands(A)	6.54	1220	1.35	8.82
Medium quality lands(B)	212.15	900	1	212.15
Poor quality lands(C)	8.83	"	"	"
Total	227.52			220.97

It will be seen from the above table that 227.52 acres of culturable land give a total of 221 P.P.U. The area under poor quality land is very small, therfore the scope for increasing of P.P.U. lies mainly in the up grading of the medium quality lands which can be only possible when these lands may be devoted to the kharif crops. Some of the cultivated fields of the medium quality lands, which are under water in the kharif season, may be saved from the floods by constructing embankments along the cultivated fields and may be utilised for cultivation of maize and millets. In this way, these fields would give additional P.P.U. for the village by yielding two crops a year.

C_H_A_P_T_E_R_ VIII

GROUP III : KHUR LANDS : (B)

Iliaspur

Piareypur

LAND UTILIZATION IN ILIASPUR

Location:

The village of Iliaspur is situated in $26^{0}54'$N latitude, and $79^{0}59'$E longitude, on the right side of the river Isan at a distanceof about 9 miles from the headquarters of tahsil Bilhaur and fortytwo miles from the headquarters of the district Kanpur. The village is attatched with the celebrated village of Makanpur,[1] and is bounded by the village of Baranda in the north, Deokali in the east, Raungaon in the south and Makanpur in the west. The village comprises an area of about 624 acres.

(1) Makanpur is a place of shrine for Muslims. One of the largest cattle fairs of the state of Uttar Pradesh is held at Makanpur in honour of a muslim saint, Syed Baduruddin Shah Madar in the month of Magh(February).

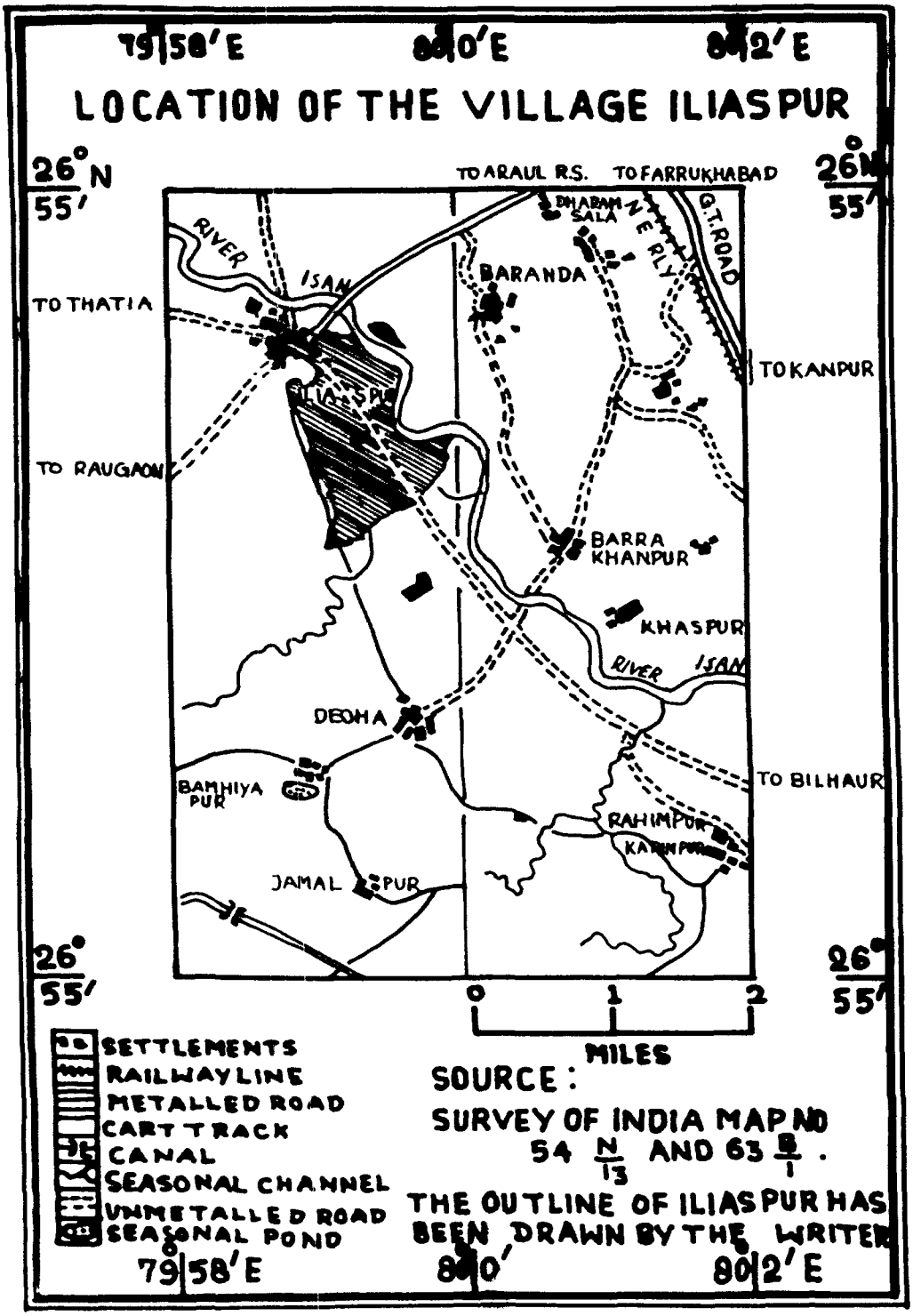
79°58'E
80°0'E
80°2'E
LOCATION OF THE VILLAGE ILIASPUR
26°55'N
TO ARAUL R.S.
TO FARRUKHABAD
DHARAM SALA
N.E. RLY.
G.T. ROAD
RIVER ISAM
BARANDA
TO THATIA
ILIASPUR
TO KANPUR
TO RAUGAON
BARRA KHANPUR
KHASPUR
RIVER ISAM
DEOHA
TO BILHAUR
BAMHIYA PUR
RAHIMPUR
JAMAL PUR
0 1 2
MILES
SETTLEMENTS
RAILWAY LINE
METALLED ROAD
CART TRACK
CANAL
SEASONAL CHANNEL
UNMETALLED ROAD
SEASONAL POND
SOURCE:
SURVEY OF INDIA MAP NO 54 N/13 AND 63 B/1.
THE OUTLINE OF ILIASPUR HAS BEEN DRAWN BY THE WRITER

Fig. 98

The village is served with note worthy means of communications. The village is connected by a three miled metalled road[1] with the Araul railway station of N.E. Railway.[2] The road crosses the river Isan at the village Makanpur by means of a ferry service which is not suspended even during the wet monsoon months. On the opposite direction to the south of the village, the same road becomes unmetalled, which leads to the old town of Rasulabad(vide Fig.98) of the Derapur tahsil of the Kanpur district, while other unmetalled roads lead to Bilhaur via the village of Decha to the east, and to the town of Thathia of the Kanauj tahsil of Farrukhabad district to the west. From Araul, the train and the Govt. Roadways bus services are available for Kanpur. Therefore, the village has an easy access to the markets of Bilhaur, Makanpur and Araul as well as to the city of Kanpur and it will be seen later in this chapter that accessibility to market has appreciable influence on the land use of the village. Physically, the village lies in the precarious tract of Isan-Bhur, which is the only area in the district, where genuine bhur is found. Viewed as a whole, the general surface of the village is fairly level witha slight undulation. The river Isan flows through a wide and sandy bed inundated every year during the wet months. The bed of the river is deep, rendering it difficult to be utilized for irrigation purposes.

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(1) This metalled road, which passes through the heart of the village, separates two settlements of the villages Makanpur and Iliaspur.

(2) N.E. Railway line runs from Kanpur to Agra.

Climate

No climatic data are recorded in the village. The data of rainfall for the headquarters of Bilhaur tahsil, which is 9 miles to the east of the village, have been given in Tables[1] XXXIII and XXXIV (on page 126) which are indicative of the rainfall for the village of Khondhan.

Land Classification

The soil of the area, in which village lies, is mainly sandy (Fig.25). An attempt has been made to classify the village fields according to the fertility and productivity of the village (see page 57) and they have been illustrated in Fig.99. The soil of the good quality land(A) is silty sand or sandy loam and these lands yield two crops a year. But genuine bhur lands consist of (sandy) soil which occurs in the medium quality lands, and is less productive than (A), but most suitable for producing ground nuts, pulses or millets. (B) lands bear single crop, either, in the kharif or in the rabi season. The poor quality lands are found towards the north-west and south-east of the village (Fig.99). To the north-west side, the village is generally bordered by the sand dunes formed by the sand drifted by the wind during the dry months, while these lands are liable to inundation during the wet months. These sandy ridges are capable of producing water melons and vegetables during the

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[1] The data of rainfall were obtained from the headquarters of the district Kanpur.

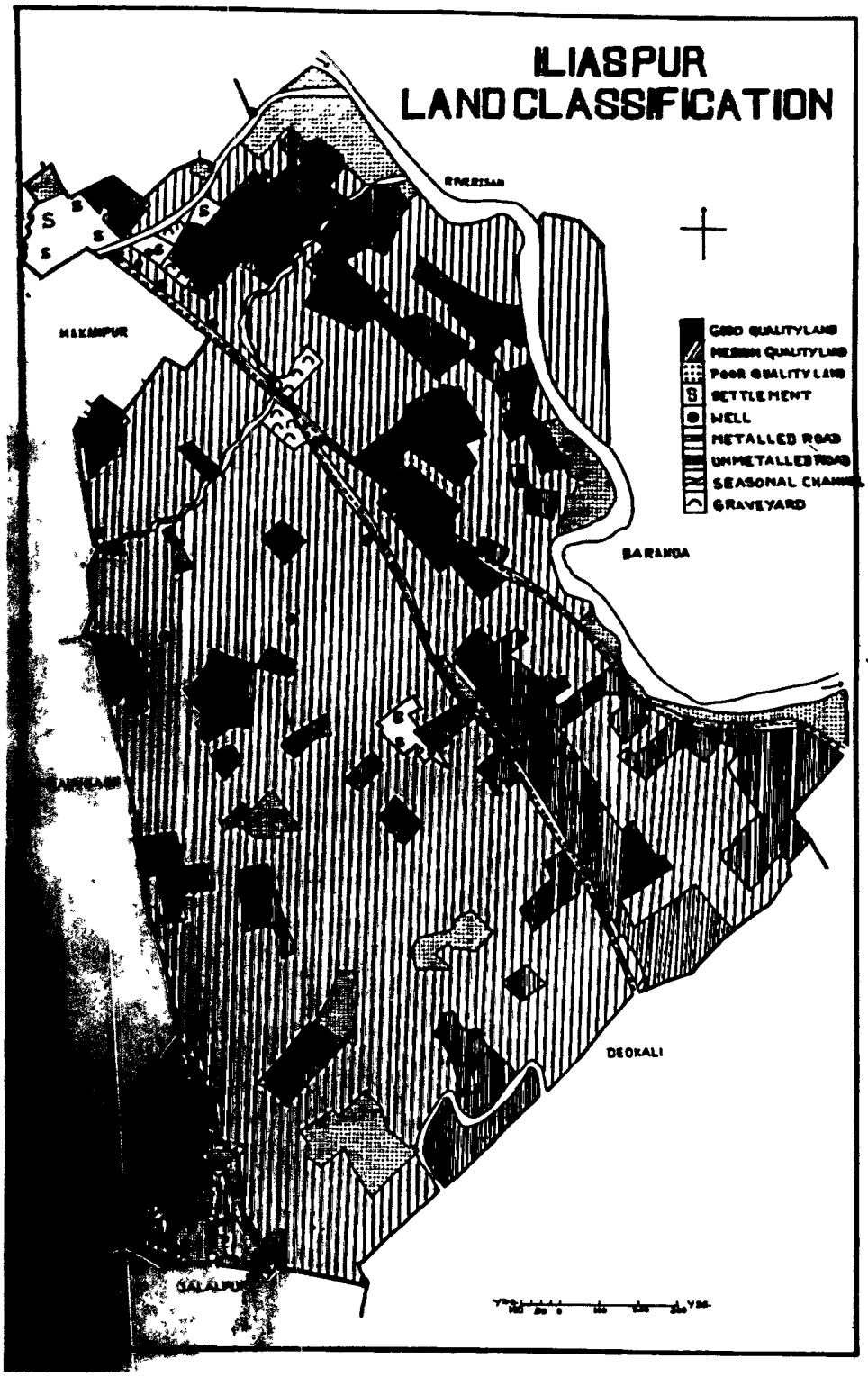
ILIASPUR
LAND CLASSIFICATION
RIVER ISAN
HEKAMPUR
BARANDA
DEOKALI
GOOD QUALITY LAND
MEDIUM QUALITY LAND
POOR QUALITY LAND
SETTLEMENT
WELL
METALLED ROAD
UNMETALLED ROAD
SEASONAL CHANNEL
GRAVEYARD

Fig. 99

months of March and April, if the river leaves the alluvial sandy soil during the rains.

It has b en observed, therefore, that with the increment of sand content, the soil fertility decreases in the village of Iliaspur.

Irrigation

Irrigation in the village is carried on mainly from wells by the pur method. The area irrigated in the rabi season of 1960-61 and the distribution of wells have been shown in Fig. 100. The average depth of wells varies from 30 to 40 feet. It will be seen from Table XXXIII that the total rainfall in the kharif season in the year under review was 50 inches and was spread over sufficient number of days in the month of July and August with the result none of the kharif crops was irrigated. The amount of rainfall was 20 inches above than that of the average rainfall and in the month of October the amount of rainfall was 11.5", which damaged severely the standing kharif crops and as a result of heavy rainfall the river Isan was in floods, which especially damaged the ground nuts, sown in the lowlying fields in the north-east of the village. Sowing of rabi crops was also delayed.

Table XXXIV shows that there was no rainfall in the months of November and December, that is why, Some of the rabi crops were irrigated. Wells are not practicable on the medium quality lands lying on the higher levels in the south and south-east of the

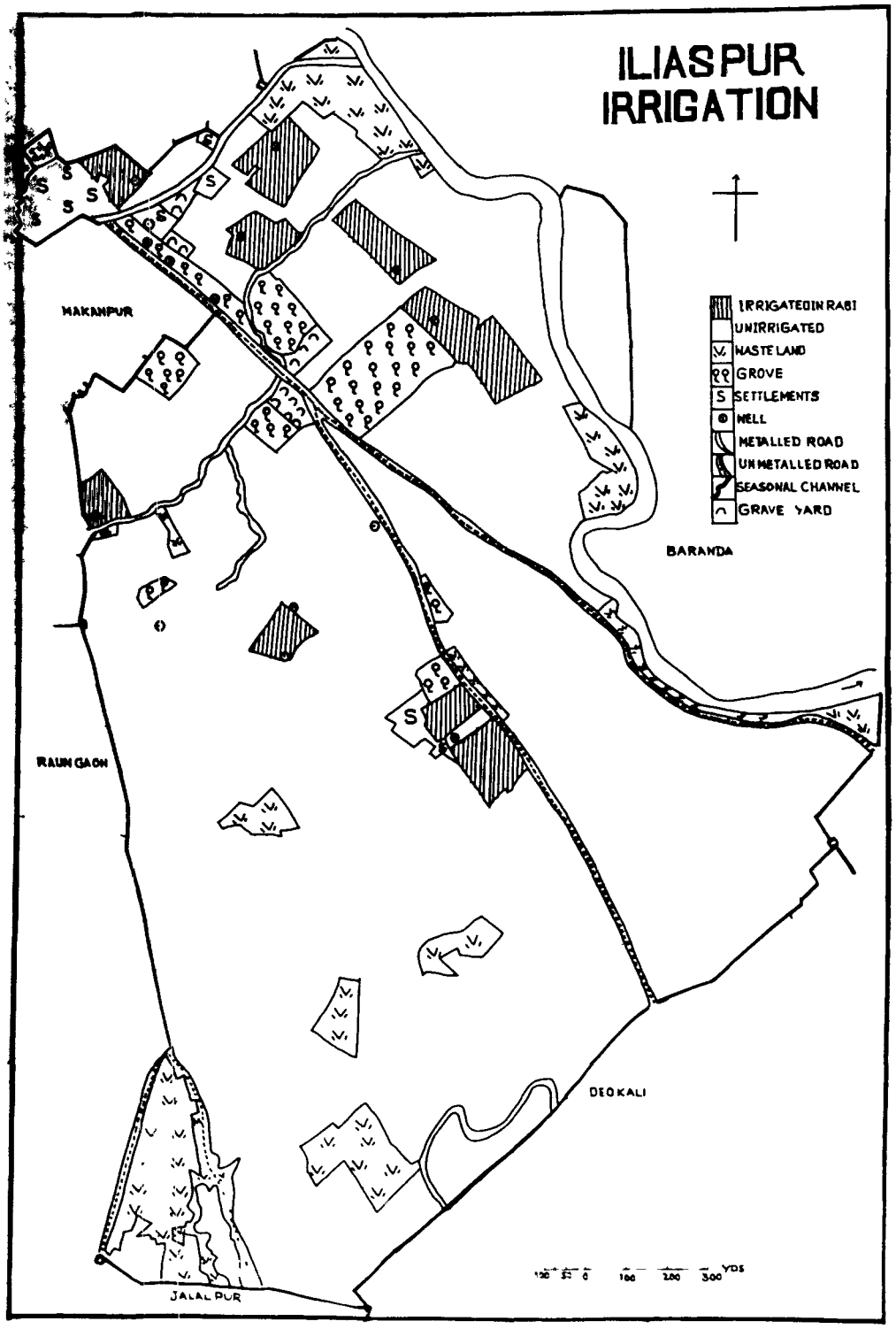
ILIASPUR
IRRIGATION
IRRIGATED IN RABI
UNIRRIGATED
WASTE LAND
GROVE
SETTLEMENTS
WELL
METALLED ROAD
UNMETALLED ROAD
SEASONAL CHANNEL
GRAVE YARD
MAKANPUR
BARANDA
RAUNGAON
DEOKALI
JALALPUR
YDS

Fig. 100

village. Practically a large part of the vilage cultivation depends almost entirely on seasonal rains, as the bhur soil needs no irrigation due to its absorbent nature. The water is so near the surface and the subsoil is so porous that even in the driest months the crops are sufficiently supplied with moisture, provided with the sufficient amount of rain in the rabi season, otherwise, the village is an easy prey to drought. However, some rabi crops of a few fields such as wheat and vegetables are irrigated in the rabi season.

Land Utilization

The land useof the village in 1960-61 is shown in Figs. 101 and 104, which are based on the Writer's field work in the village.[1]

Table LXXXI

Total area of the village--623.94 acres

Use of land	Area in acres	Percentage of the total area
Cultivated land	532.46	85.34
Waste land	38.27	6.13
Grove	23.47	3.77
Settlement	8.84	[illegible]
Grave yards	3.19	0.51
Road	6.81	1.09
River & its seasonal channels	10.90	1.74
Total	623.94	100.00

(1) The base map showing the fields and their areas was obtained from the Lekhpal of the village concerned with the permission of Tahsilda of the Bilhaur tahsil. Iliaspur was visited by the Writer in the kharif season of 1960 and the rabi season of 1961, and the use to which each field was being put was recorded on the base map. From the data Figs. 101 and 104 were prepared.

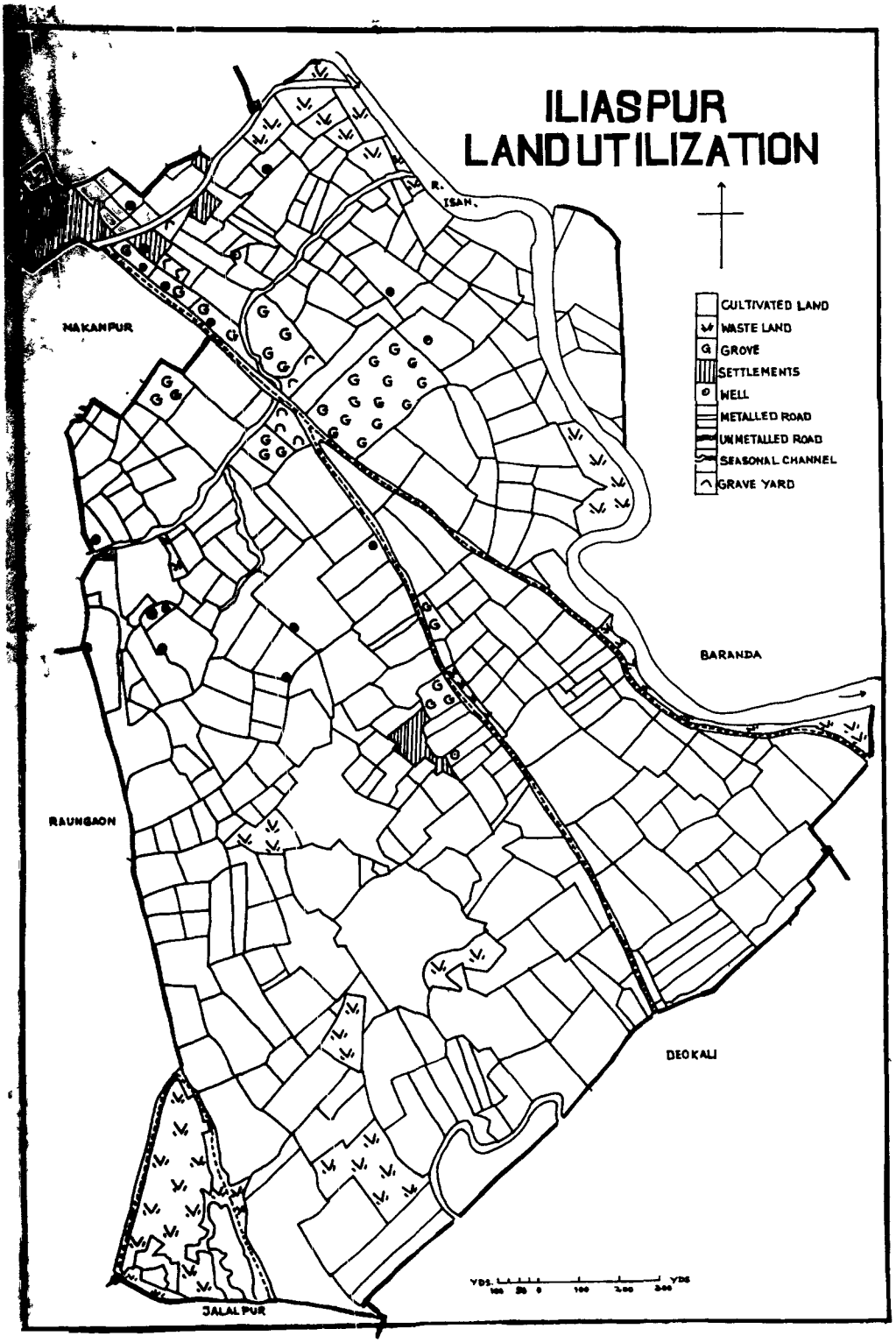
ILIASPUR
LAND UTILIZATION
R. ISAN
NAKANPUR
BARANDA
RAUNGAON
DEOKALI
JALALPUR
CULTIVATED LAND
WASTE LAND
GROVE
SETTLEMENTS
WELL
METALLED ROAD
UNMETALLED ROAD
SEASONAL CHANNEL
GRAVE YARD
YDS.
YDS

Fig. 101

It will be seen from Table LXXXI that 85 per cent of the total land is cultivated, 3 per cent devoted to non agricultural uses, about 4 per cent under groves,[1] 2 per cent captured by the river Isan, while 6 per cent is wasteland and unproductive because of the occurrence of loose coarse sand.

A comparison of Figs. 99 and 101 shows a close relationship between the quality of land and the size of the fields. The fields of the good quality land are mostly small in size, while the fields of the medium quality land are relatively large. Some fields are even more than 10 to 15 acres in size and they are especially devoted to, either, ground-nuts or groundnuts mixed with pulses. The following Table will show the different size groups of the fields in 1960-61.

Table LXXXXII

Size of fields	Number of fields of each size	Percentage of the fields of each size to the total number of plots
Below 0.50 acre	81	20.1
0.50 to 1.0 acre	114	28.2
1.0 to 2.0 acres	114	28.2
2.0 to 3.0 acres	42	10.4
3.0 to 4.0 acres	28	6.9
4.0 to 5.0 acres	11	2.7
over 5 acres	14	3.5
Total	404	100.00

(1) The groves in the village mainly consist of Palm trees from which toddy(tari) is extracted.

Table LXXXII shows that 81 fields or 20-1 per cent of the total number of fields are below 0.50 acre, while majority of the fields vary between 0.50 and 2 acres and are of the medium quality lands. 42 fields or 10.4 per cent of the total vary between 2 to 3 acres, while 53 plots are over 3 acres in size. This tabulator analysis further shows that fields of this village are comparatively larger than that of the other villages.

Land Utilization in the Kharif Season

The use of the land in the kharif season of 1960 is illustrated in Fig. 102. The area occupied by each crop is shown in the following Table.

Table LXXXIII

Gross cultivated area [illegible] acres
Net cropped area in the kharif season 328.90 acres

Crops	Area in acres	Percentage of gross cultivated land	Percentage of net cropped land	Total percentage of gross cultivated land	Total percentage of net cropped land
Grain Crops:				13.76	21.63
Maize	38.34	7.21	11.32		
Bulrush Millet	20.74	3.89	6.12		
Millet	7.32	1.37	2.16		
Millets and Pulses	6.45	1.21	1.90		
Pulses	0.46	0.08	0.13		
Other Crops:				49.99	78.37
Groundnuts	242.04	45.46	71.41		
Ground nuts & Millets	10.23	1.93	3.02		
Groundnuts & Pulses	8.73	1.64	2.57		
Fodder	4.17	0.78	1.23		
Vegetables	0.48	0.09	0.14		
Fallow	193.50	36.34	..	36.34	...
Total	532.46	100.00	100.00	100.00	100.00

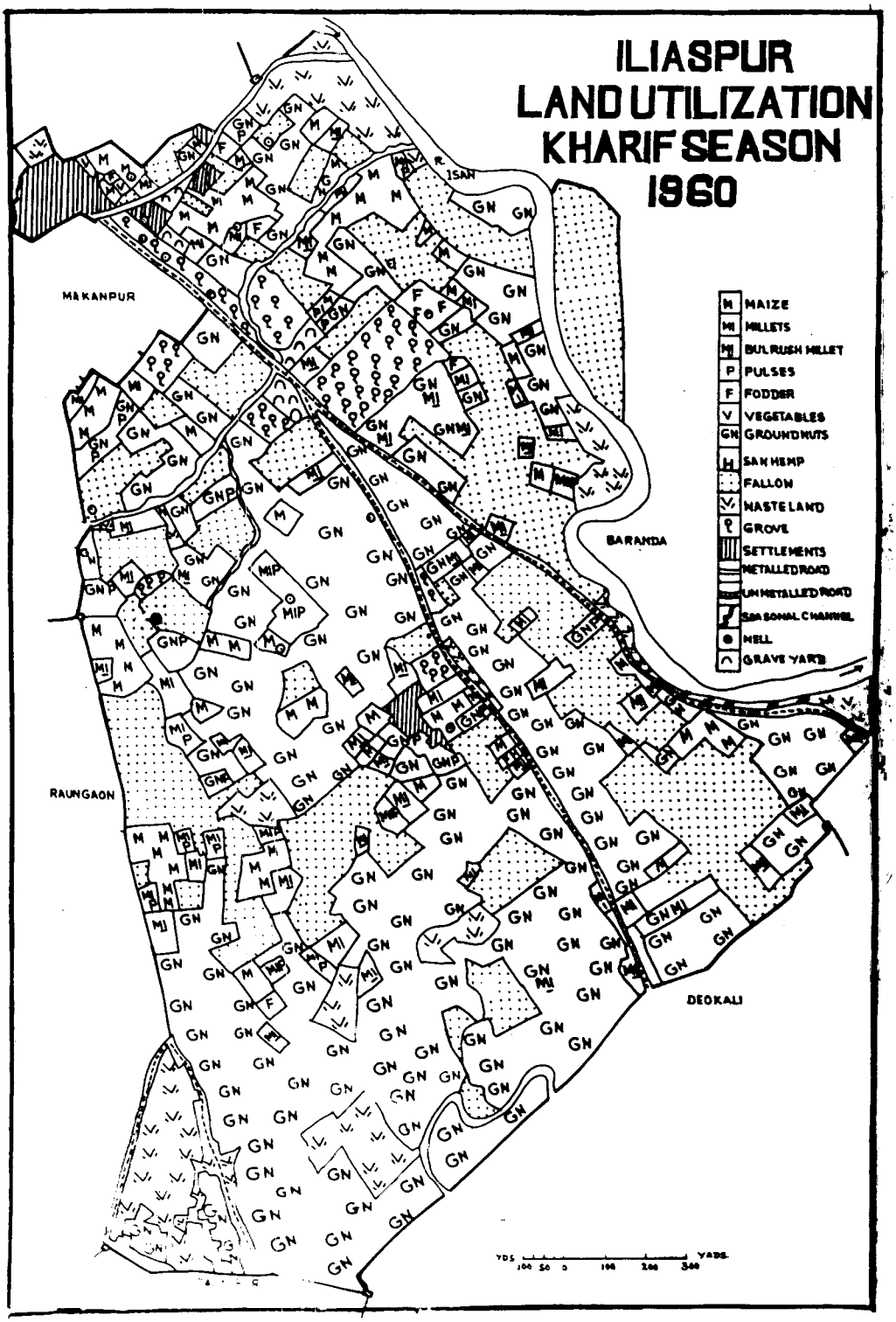
ILIASPUR
LAND UTILIZATION
KHARIF SEASON
1960
MAKANPUR
RAUNGAON
BARANDA
DEOKALI
R. ISAN
M MAIZE
Mi MILLETS
Mi BULRUSH MILLET
P PULSES
F FODDER
V VEGETABLES
GN GROUNDNUTS
SH SAN HEMP
FALLOW
WASTE LAND
GROVE
SETTLEMENTS
METALLED ROAD
UNMETALLED ROAD
SEASONAL CHANNEL
WELL
GRAVE YARD
YDS
100 50 0 100 200 300
YARDS

Fig. 102

It will be seen from Table LXXXIII that nonfood crops occupy about four-fifths of the net cultivated land, while grain crops cover only one-fifth of the net cropped area in the kharif season. Ground nut, either, sown as sole, or mixed with millets or pulses is the major crop covering nearly 77 per cent of the net cropped land. The crop seems to be most suitable for the village, as it grows best on well-drained bhur lands with sandy or light sandy loam soils. It is particularly sensitive to water logging. The tillage is similar to that of maize, the crop can be sown in drills behind the plough or the seed may also be placed in holes by hand. The crop needs no irrigation if rainfall during July, August and September is well distributed. In the year of inquiry heavy rains in the month of October damaged the standing crop. In order to get a good yield of nuts, careful weeding is required until the crop covers the ground and surface soil should not also be hard at the time of the flowering of the plant. When the flower falls, the stock bends over and enters the ground, where the seed forms as a nut. These nuts have to be protected from birds, pigs and rats.

The nuts are usually ready for digging in the months of November or December. The outturn per acre in the year of inquiry was 1500 lbs.

It is grown on the commercial basis and is the main source of income for the villagers. It has been discussed in the foregoing pages that Jabalpur is favourably located as regards means of communication, so the nuts are sold in the neighbouring

markets, or, are exported to the city of Kanpur, where oil is extracted from the nuts in oil mills and the residue may be used as cattle food . But generally nuts are sold locally for food.

Maize is the next important crop and covers another 11 per cent of the net cultivated land. It is grown on the good quality lands near the settlement. Other crops are bulrush millet, big millet and millet mixed with pulses.

A comparative study of Figs. 99 and 102 reveals that there is a close influence of the soil on the crop pattern. Ground nuts mostly occupy the medium quality lands (B), where a great deal of bhur is found, while maize, fodder and vegetables cover mostly the good quality land, where the soil is loamy sand. 36.34 per cent of the gross cultivated area is left fallow in the kharif season for these lands are capable of producing one crop a year.

Land Utilization in the Rabi Season

The use of land in the rabi season of 1960-61 is shown in Fig. 103. The area occupied by each crop in this season is shown in Table LXXXIV.

Table LXXXIV

Gross cultivated area	532.46 acres
Net cropped area in the Rabi season	277.68 acres

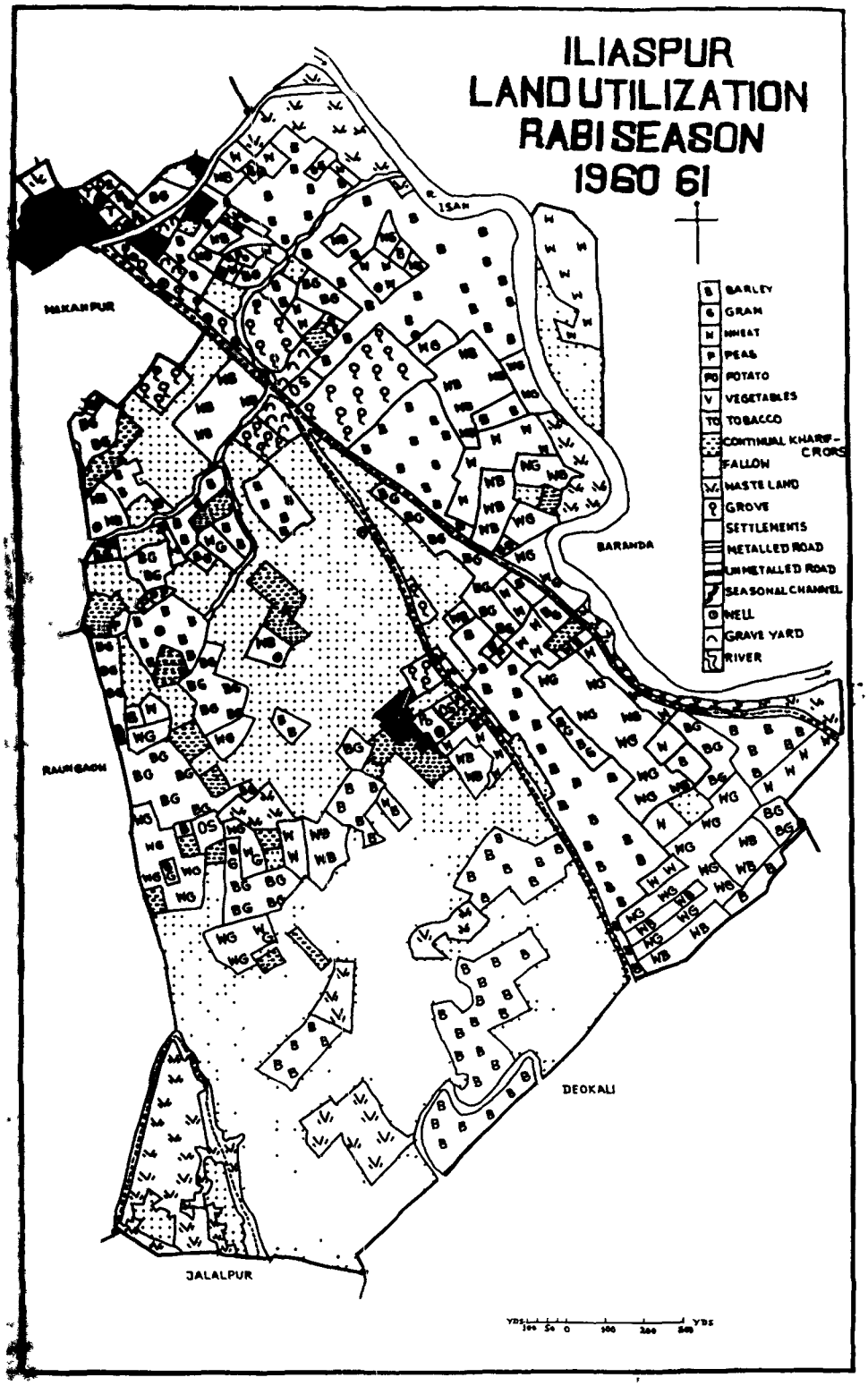
ILIASPUR
LAND UTILIZATION
RABI SEASON
1960 61
R. ISAN
NIKANPUR
RAMGARH
BARANDA
DEOKALI
JALALPUR
BARLEY
GRAM
WHEAT
PEAS
POTATO
VEGETABLES
TOBACCO
CONTINUAL KHARIF-CROPS
FALLOW
WASTE LAND
GROVE
SETTLEMENTS
METALLED ROAD
UNMETALLED ROAD
SEASONAL CHANNEL
WELL
GRAVE YARD
RIVER

Fig. 103

Crops	Area in acres	Percentage of gross cultivated area	Percentage of net cropped area	Total percentage of gross cultivated land	Total percentage of net cropped land
GRAIN CROPS:-				50.89	97.58
Barley	119.61	22.46	43.07		
Gram & Barley	40.83	7.67	14.71		
Gram & Wheat	38.41	7.21	13.83		
Barley andWheat	37.41	7.03	13.47		
Wheat	34.30	6.44	12.35		
Peas	0.41	0.08	0.15		
OTHER CROPS:				1.26	2.42
Linseed	3.59	0.68	1.29		
Potatoes	1.32	0.25	0.48		
Vegetables	0.66	0.12	0.24		
Tobacco	1.14	0.21	0.41		
Continual kharif crops	15.18	2.85	..	2.85	...
Fallow	239.60	45.00	..	45.00	...
Total	532.46	100.00	100.00	100.00	100.00

It will be seen from Table LXXXIV that grain crops occupy nearly 98 per cent of the net cropped area in the rabi season. One of the important reasons for the largest percentage occupied by the grain crops is, perhaps, the shortage of food for the villagers, as, during the kharif season only a little less than one fourth of the net cropped area is devoted to food cereals due to the highest percentage of ground nuts. Another interesting feature of the rabi crops, as it is clear from Table LXXXIV is the reduction of the net cropped land in the rabi season. The net cropped area is less than that of the net cropped area of the kharif season, because the sandy area is [illegible] net cropped area of the kharif sea

ridges devoted to ground-nuts, which covered 48 per cent of gross cultivated land in the kharif season, are left fallow in the rabi season. These lands are not capable of producing an other crops.

Barley is the principal crop and by itself covers about 43 per cent of the net cropped land and is the staple diet of the people of the village. Barley is grown well on a lighter soil without providing irrigation facilities. Hence medium quality lands, where the soil is light sandy loam are well suited to the cultivation of Barley.

Mixed cropping is a common practice in the village, as crops mixed with barley and gram and wheat and gram cover other 15 and 14 per cent respectively. Tobacco[1] is mainly grown for cash and its cultivation is mainly confined to the good quality lands, where the crop is irrigated by wells. Food cereals produced in the village are not sufficient, thus the villagers have to purchase grains from the neighbouring markets, while they sell their major produce of ground nuts. The area under vegetables and potatos is insignificant in the village. Land with light sandy soil can be fed with manures so as to be extremely productive of vegetables and can provided with the facility of irrigation they can be extensively grown f for cash.

Double Cropped Land

The total of the land cropped twice in the year 1960-61 was 84.1[3] acres or about 15.8 per cent of the gross

(1) The Writer has gathered from the villages during the course of his field work that tobacco has lost its importance now, perhaps, due

Contd..2

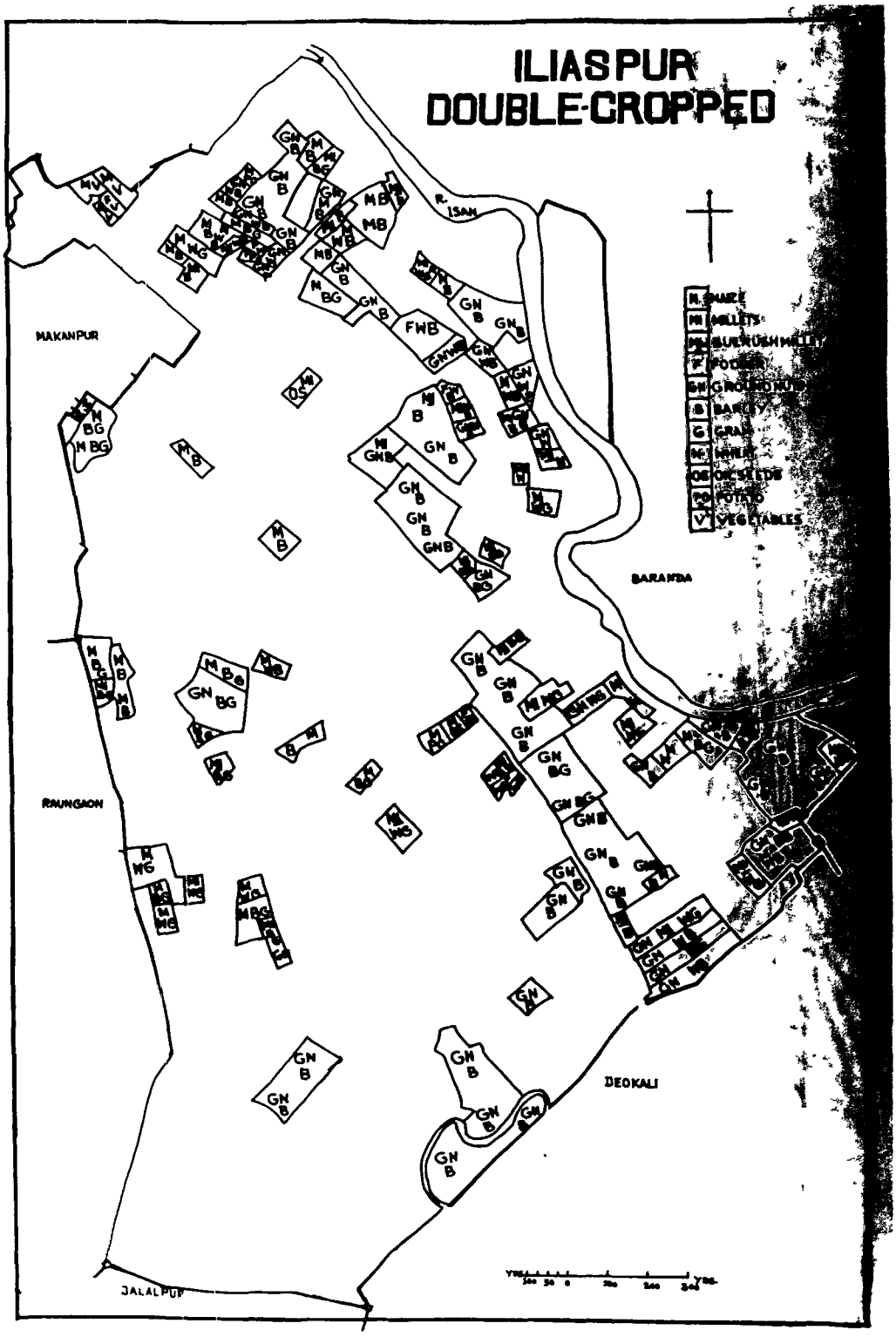
ILIASPUR
DOUBLE-CROPPED
R. ISAN
MAKANPUR
BARANDA
RAUNGAON
DEOKALI
JALALPUR
M. MAIZE
MI MILLETS
BM BLUEBUSH MILLET
P POTATO
GN GROUNDNUT
B BARLEY
G GRAM
W WHEAT
OS OILSEEDS
P POTATO
V VEGETABLES

Fig. 104

cultivated land. It will be seen from a comparison of Figs.99 and 104 that the double cropping is mainly confined to good quality lands (A). The area under double cropping is reduced due to the existence of medium quality lands with less fertility and productivity, which possess a great deal of bhur and used for ground nuts only. The light sandy soils are also less productive and without adequate manures do not yield two crops a year.

Land use and Population

The following Table shows the totals of various categories of lands in the village and per capita share of the villagers in them.

Table LXXXV

Total population depending upon the produce of the village----472[1]

	Total area of the village	Total available land for cultivation	Net cropped land in the Kharif season	Net cropped land in the rabi season	Total cultivated land (both of kharif and rabi	Double cropped land
Area (in acres)	623.94	532.46	338.96	277.68	616.64	84.18
Land per head of population	1.32	1.13	0.72	0.59	1.31	0.18

Contd..to heavy excise duty imposed by the Government. Linseed has gradually taken place of tobacco.

(1) Data based upon the census figures of 1961.

It will be seen from Table LXXXV that the per capita figure of arable land in this village comes up to 1.13 acres, but in the kharif and rabi seasons the per capita cultivated land is reduced to 0.72 and 0.59 acre respectively. The reduction in the per head cultivated land in the kharif season is due to the practice of fallowing, while in the rabi season the reduction is caused by the continual kharif crops and also by the practice of fallowing, because the bhur lands are left fallow after the digging of the ground nuts.

Table LXXXV further shows that the per capita land cropped twice in the year is 0.18 acre, the gross total of per capita cultivated land being 1.31 acres. In other words, the amount of land supporting one person in Ihiaspur is 1.31 acres, which is larger than that of the other villages.

The pressure of population on land can be understood, when the occupation of the people are considered. About 315 persons,[1] or about 67 per cent of the total population, are primary rural and are entirely dependent upon land, while 33 percent consist of the secondary rural population, which indirectly depend upon the land. Besides agriculture, some people are also business men, as Makanpur is the main market for exporting the ground nuts and linseed. The standard of living and health in the village is comparatively lower than that of the well drained villages, because

(1) Data based upon the personal survey by the Writer during the course of field work.

the productive capacity of the village is low. The [illegible] (sandy) soil of bhur land is not capable of producing two crops in a year and the yields of different crops (See Table CXIV A) are also low. The following Table shows the potential productive units of the village.

Table LXXXVI

Average yield per acre of good farmland

820 lb. = 1 P.P.U.

Types of land	Area in acres	Average yield in lb. per acre	Productivity rating per acre	Number of P.P.U.
Good quality lands(A)	84.18	1230	1.5	126.27
Medium quality lands(B)	447.28	820	1.0	447.28
Poor quality lands(C)	38.27	..	..	[illegible]
Total	569.73			574.55

The above Table reveals that 569.73 acres of cultivated land give a total of 575 P.P.U. The scope for increasing the number of P.P.U. lies mainly in the ungrading of medium quality lands and making them capable of producing two crops in a year. They should be fed with manures and provided with irrigation facility. Groundnuts may be replaced with other food cereals such as maize in the kharif and barley or barley mixed with gram in the rabi season.

****

LAND UTILIZATION IN PIAREYPUR

Location

The village of Piareypur is situated in 26°44'N latitude and 80°8'E longitude, in the Bilhaur tahsil of the Kanpur district. It is lying on the high bluff of the river Ganga, which marks its right bank, it is bounded by the villages of Radhan in the Northwest, Panka in the east, Munhpochha in the south, Sadikamau in the south-west and Aunarabari in the west.

The village is accessible by a cart track[1] running through the heart of the village. This track joins an other cart track, which passes through the villages of Kakupur, Sadikamau and Lachhimanpur in the south-west (Fig. 105) and the same cart track ultimately joins the Grand Trunk Road at Shivarajpur, lying to the south-east of the village at a distance of about 4 miles, where market is held twice a week. Just close to the market place of Shivarajpur is

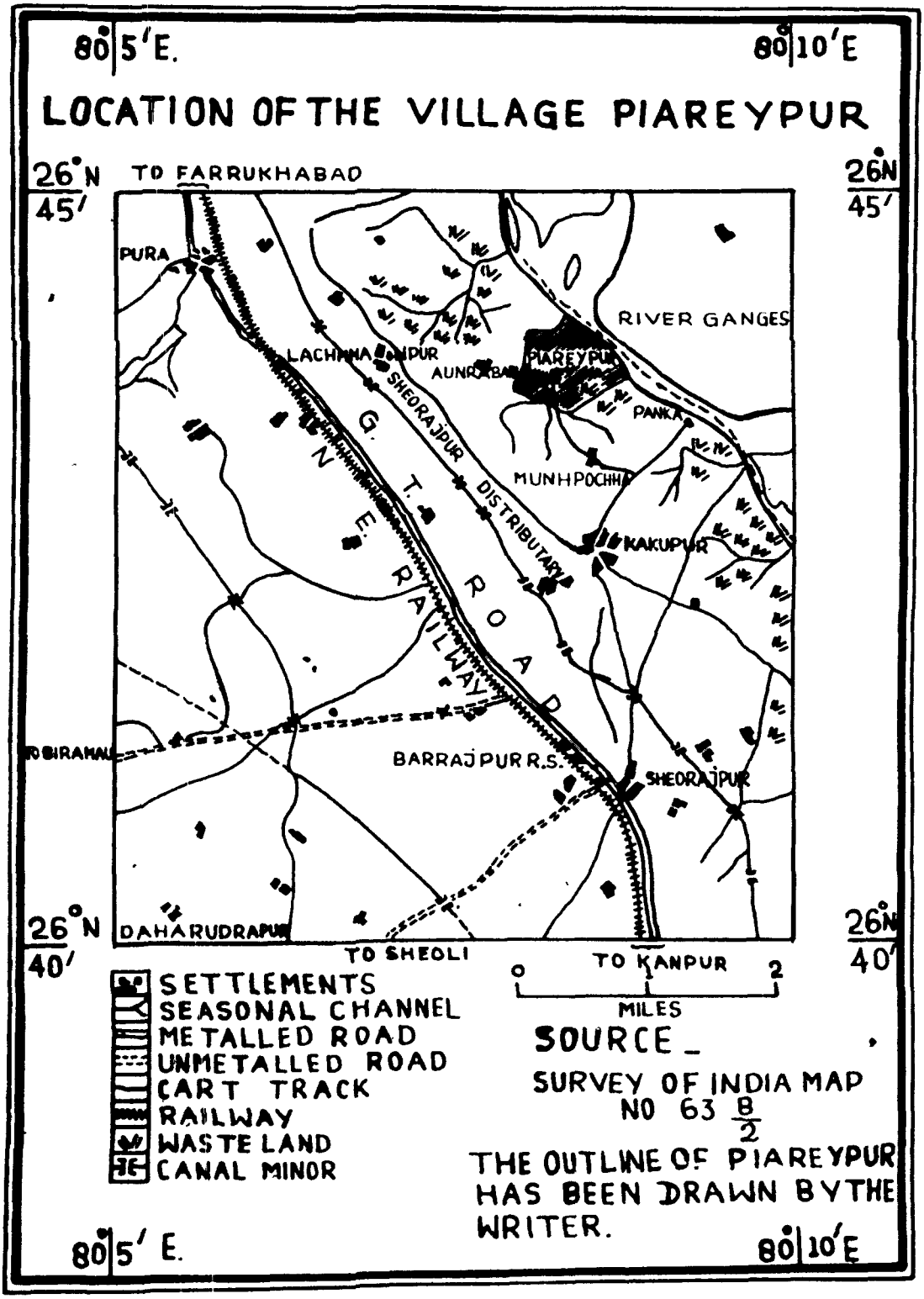
80°5'E.
80°10'E
LOCATION OF THE VILLAGE PIAREYPUR
26°N 45'
TO FARRUKHABAD
PURA
RIVER GANGES
LACHHMANPUR
AUNRIBA
PIAREYPUR
PANKA
SHEORAJPUR
DISTRIBUTARY
MUNHPOCHHA
KAKUPUR
N.E. RAILWAY
G.T. ROAD
TO BIRAHAL
BARRAJPUR R.S.
SHEORAJPUR
DAHARUDRAPUR
TO SHEOLI
TO KANPUR
0 1 2
MILES
SETTLEMENTS
SEASONAL CHANNEL
METALLED ROAD
UNMETALLED ROAD
CART TRACK
RAILWAY
WASTE LAND
CANAL MINOR
SOURCE _
SURVEY OF INDIA MAP
NO 63 B/2
THE OUTLINE OF PIAREYPUR
HAS BEEN DRAWN BY THE
WRITER.
80°5'E.
80°10'E

Fig. 105

is Barrajpur railway station of N.E. Railway, which runs parellel to the Grand Trunk Road and leads to the city of Kanpurabout 25 miles to the east of the village.

The village has, therefore, an easy access to the markets of Kakupur and Shivrajpur as well as the city of Kanpur.

The Ganga flows about six furlongs to the north of Piareypur which determines the topography of the village. The river is flanked by the high bank, the crest of which is well above the general level of the interior. The village is safe from floods. A seasonal channel to the north-east of the village, formed by the gully erosion, drains the water to the Ganga, but during the summers it is dry. The Ganga bluff consists of poor, hard and gritty soil, scoured by ravines. Bhur is wide spread in the village. Owing to constant erosion, the soil has become inpoverished and its value as an arable land is further reduced by the absence of irrigation.

Climate

No climatic data are recorded in the village. The data of rainfall recorded at the headquarters of the Bilhaur tahsil, which is 13 miles to the south-west of the village, may be taken as close approximation for the village. The data has already been given for the village of Khondhan in Tables XXXIII and XXXIV on page.....126.

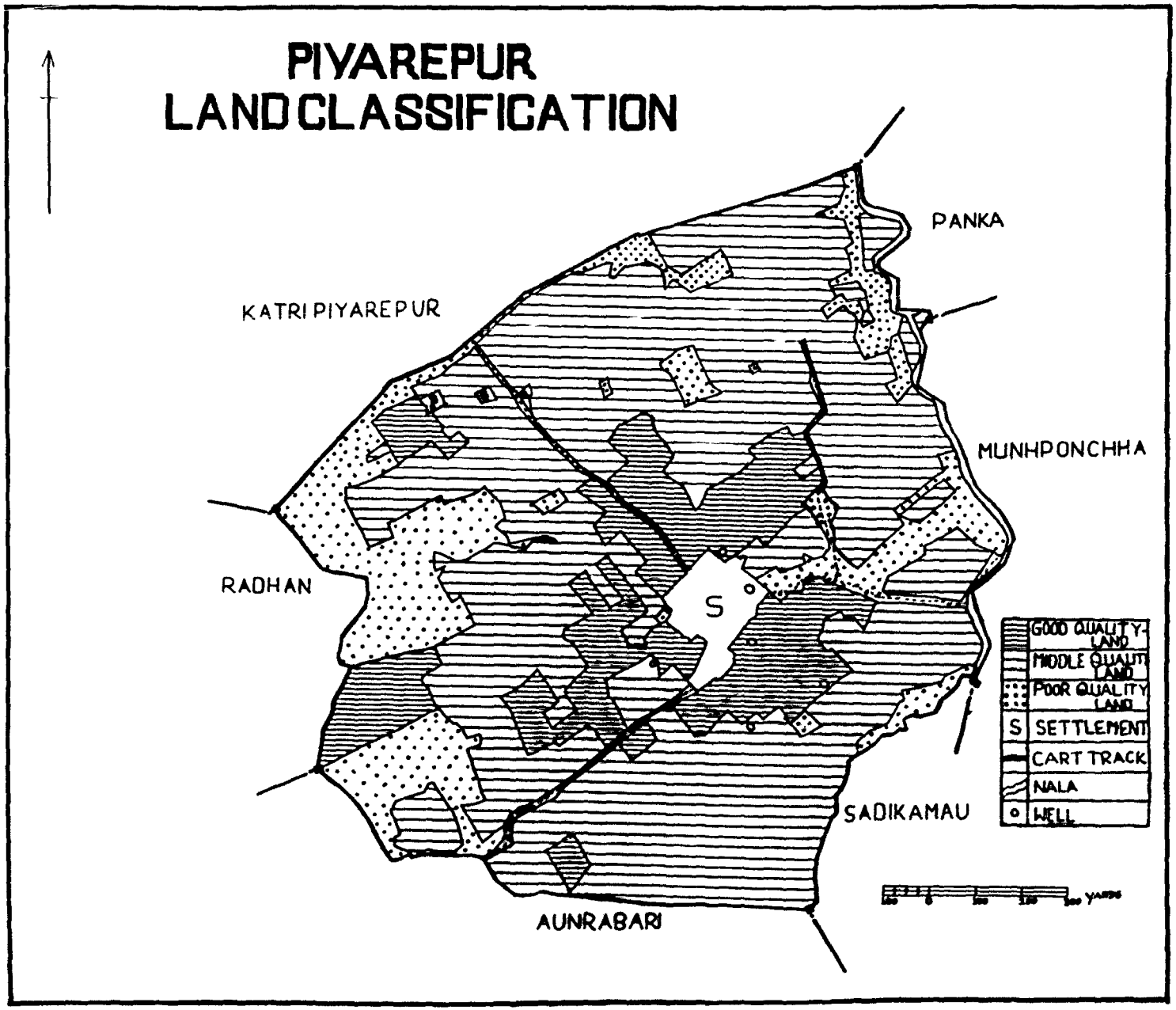
PIYAREPUR
LAND CLASSIFICATION
PANKA
KATRI PIYAREPUR
MUNHPONCHHA
RADHAN
S
SADIKAMAU
AUNRABARI
GOOD QUALITY LAND
MIDDLE QUALITY LAND
POOR QUALITY LAND
S SETTLEMENT
CART TRACK
NALA
WELL

Fig. 106

Land Classification

The soil of the area in which the village is situated is mainly sandy known as bhur. On the basis of the fertility and productivity the village fields have been classified and mapped in Fig. 106.

The soil of the good quality land (A) is sandy loam. These lands yield two crops a year and lie near the Basti(settled area). They are included into Gauhan land sand consist of more fertile soils due to higher percentage of plant food, enriched by the night soil, house refuse and the like coming out of the Basti.

The soil of medium quality lands (B) is less productive than (A) as they are farther from the Basti. The soil of these lands is light loamy sand and capable of producing one crop a year. The medium quality lands are either, left fallow in the kharif, or, devoted to the crops of millets and groundnuts mixed with pulses.

The soil of the poor quality land is rendered unproductive due to the presence of ravines, especially towards the north-west of the village, where the Ganga bluff rises above the sandy fore shore.

Irrigation

The whole of the village, except a few fields possesses no irrigation facilities, as the entire area is beyond the

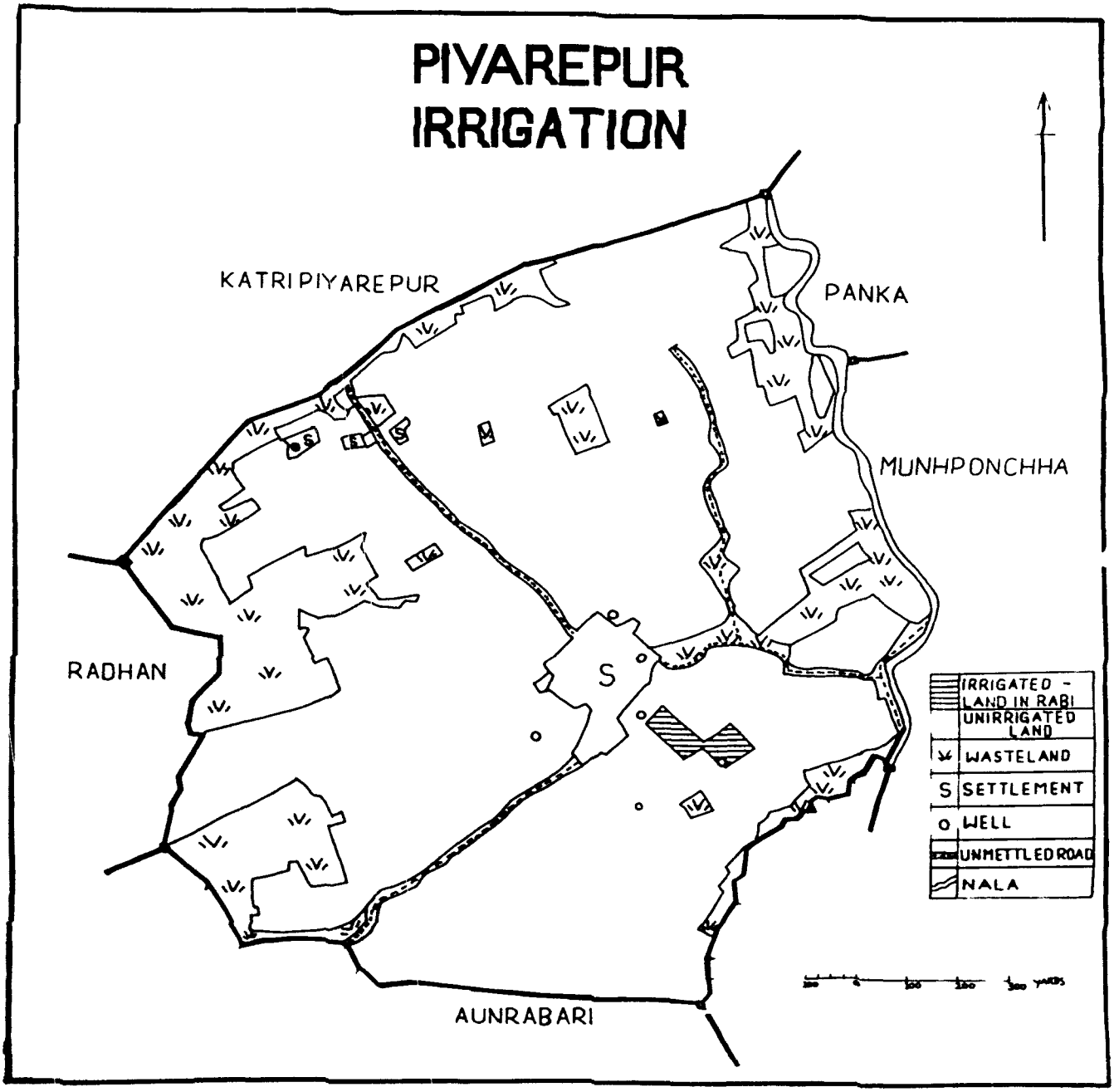
PIYAREPUR
IRRIGATION
KATRI PIYAREPUR
PANKA
MUNHPONCHHA
RADHAN
AUNRABARI
S
IRRIGATED - LAND IN RABI
UNIRRIGATED LAND
WASTELAND
S SETTLEMENT
WELL
UNMETTLED ROAD
NALA

Fig. 107

reach of canal irrigation facilities. Wells are at present not practicable for waterings owing to sandy substratum. Though a few earthen wells exist in the village, the sandy soil makes the construction of masonry wells difficult and expensive. Thus, kharif, and rabi crops are entirely dependent upon rainfall. The rabi crops are unable to receive sufficient amount of water for proper growth, as it is clear from the Table XXXIV that in the year of inquiry the rainfall in rabi season was 1.93 inches, which was inadequate for crops like wheat and potatoes. All these result into low yield of crops per acre[1]. That is why the villagers are accustomed to devote the major portion of the cultivated land either to the mixed crops, or leguminous crops such as ground nuts, pulses and gram. However, there are two wells, which irrigated in the year of inquiry about 2.2 acres of land in the rabi season which was less than 1 per cent of the gross cultivated area.

The area irrigated in the village in the rabi season of 1960-61 is shown in Fig. 107.

Land Utilization

Land use of the village based upon the Writer's field work[2] is shown in Figs. 108 to 111. The Table LXXXVII gives a summary of the proportions of the village lands devoted to various uses in 1960-61.

---

(1) In the year of inquiry the yields of wheat and barley were estimated at 740 and 820 lbs. per acre respectively.

(2) The base map showing the fields and their areas was obtained from the Lekhpal of the village concerned. The village was visited by the Writer in the kharif season of 1960 and in the rabi season of 1961 and the use to which each field was being put was recorded on the base map. From the data Figs. 108 to 111 were prepared.

Table LXXXVII

Total area of the village --284.61 acres.

Use of land	Area in acres	Percentage of the total area
Cultivated land	224.50	78.88
Wasteland	49.74	17.47
Settlement	6.23	2.19
Road	3.44	1.21
River & Seasonal cannel	0.70	0.25
Total	284.61	100.00

It will be seen from the above Table that nearly 79 per cent of the land is cultivated, 4 per cent is devoted to non-agricultural uses, while 17 per cent is not utilized as it is occupied by ravines of the river Ganga.

A comparison of Figs. 106 and 108 reveals the influence of the quality if land on the size of the fields. For the most part, the fields of the good quality lands are small and rectangular, while those of the medium quality lands are relatively large.

The size of the plots in 1960-61 was as in Table LXXXVIII.

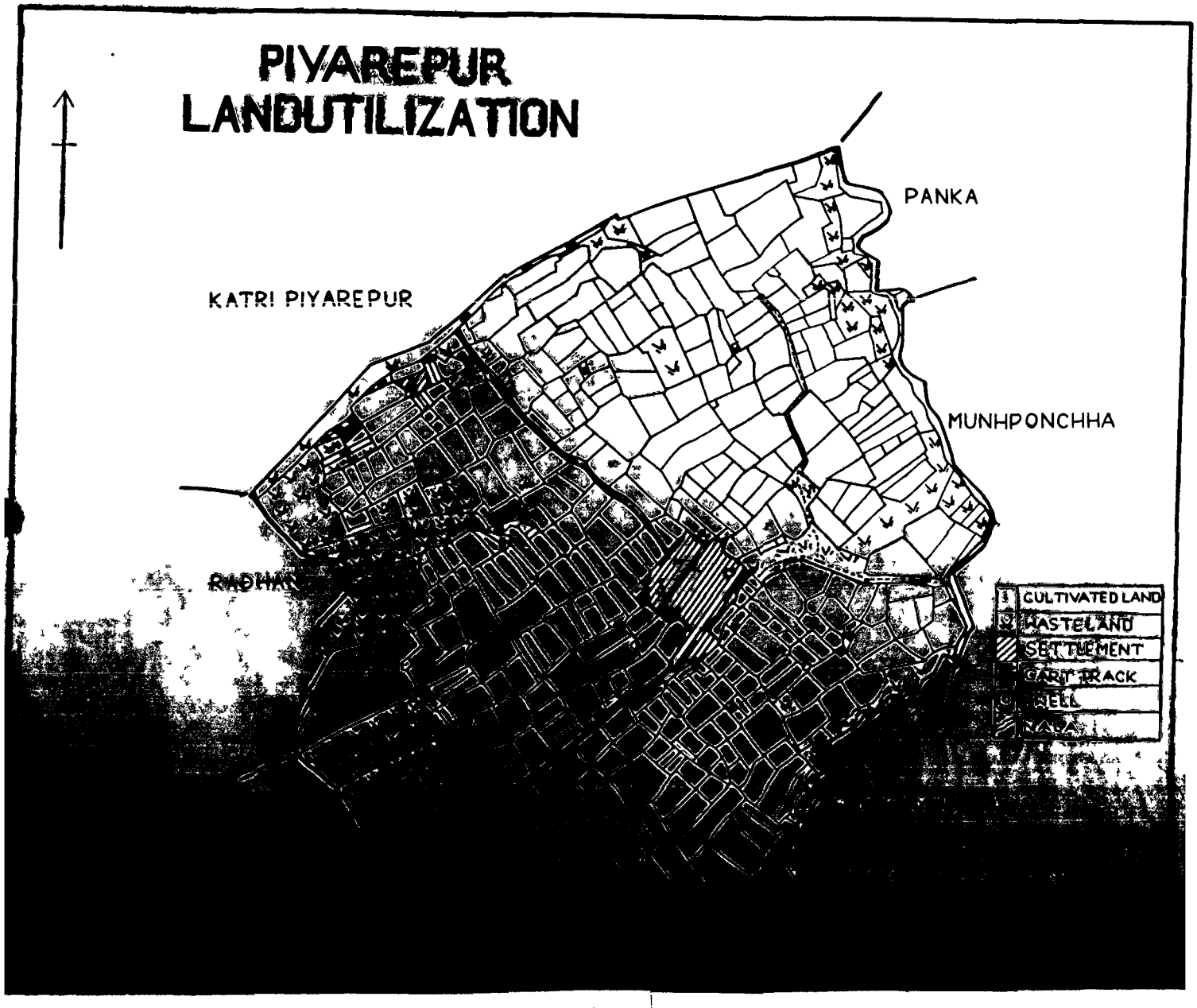
PIYAREPUR
LANDUTILIZATION
PANKA
KATRI PIYAREPUR
MUNHPONCHHA
RADHAK
1 CULTIVATED LAND
2 WASTELAND
SETTLEMENT
CART TRACK
WELL

Fig. 108

Table LXXXVIII

Size of plots	Number of plots of each size	Percentage of the plots of each size to the total of plots
Below 0.50 acre	266	55.1
0.50 to 1.0 acre	160	33.1
1.0 to 2.0 acres	46	9.6
2.0 to 3.0 acres	4	0.8
over 3 acres	7	1.4
Total	483	100.00

The above Table shows that holdings are very small in the village. 88 per cent of the plots are below one acre in size. The majority of the plots (55.1 per cent) are even below .50 acre. 46 plots vary between 1 and 2 acres, while only 11 plots or 2.2 per cent of the total are above 2 acres in size.

Land Utilisation in the Kharif Season

Fig. 109 illustrates the use of land in the kharif season of 1960. The area occupied by each crop in this season is shown in Table LXXXIX.

Table LXXXIX

Gross cultivated area 224.50 acres
Net cropped land in the kharif season 118.03 acres

Crops	Area in acres	Percentage of gross cultivated area	Percentage of net cropped area	Total percentage of gross cultivated land	Total percentage of net cropped land
GRAIN CROPS:				46.04	87.56
Maize	46.83	20.85	39.70		
Millet & Pulses	39.61	17.64	33.56		
Small millet & Bulrush	15.75	7.05	13.34		
Bulrush & Millet	1.14	0.50	0.96		
OTHER CROPS:				6.54	12.44
Groundnuts & pulses	11.79	5.25	9.98		
Fodder	2.91	1.29	2.46		
Fallow	106.47	47.42	..	47.42	...
Total	224.50	100.00	100.00	100.00	100.00

The above Table indicates that grain crops occupy nearly nine-tenths of the net cultivated land in the kharif season. Maize is the principal crop and occupies nearly four-tenths of the net cultivated area. Maize is one of the staple diets of the people of this village. It is sown more usually either broadcast or in drills behind the plough in early July on good quality lands fed with manures. It needs no irrigation if rainfall during July and August is well distributed, on the other hand, if there are long

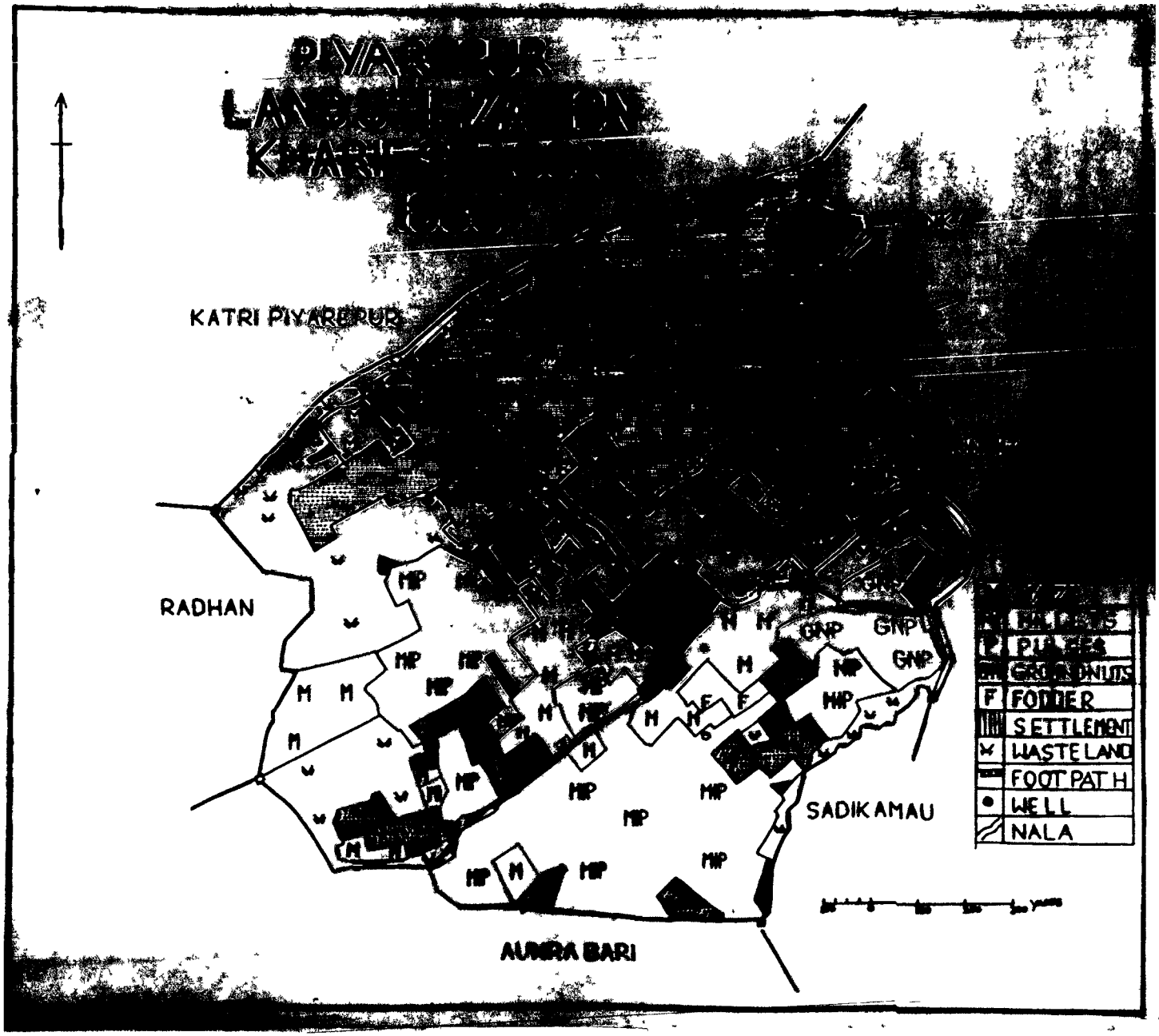
KATRI PIYARERPUR
RADHAN
SADIKAMAU
AURRA BARI
MP
M
GNP
F
SETTLEMENT
WASTE LAND
FOOT PATH
WELL
NALA

Fig. 109

breaks in the incidence of rainfall, the crop is damaged in the village, as there is no facility for watering the fields. Water logging is disastrous for the plant. The crop matures in September, Moreover, the early maturity of the crop provides the cultivator and his family with food at a time when the reserves of the rabi grains are running short. Its cobs are the main source of income as well as the food. Immature cobs, sometimes, are picked by the villagers and sold to be roasted for food in the market of Shivrajpur.

The cultivation of maize, however, is a laborious business. In order to get a good yield of grain, the distance between the maize plants should be about a foot and, therefore, the seeds have to be sown carefully. Several ploughings are necessary, weeding is another operation. The crop is to be protected from birds, stray animals and even human beings and the crop has to be watched regularly till the harvel is ready.

The stalks are nutritious fodder, if they are cut while green, but as the crop is grown for its grains, the stalks are used for fuel.

Millets mixed with pulses is the next important crop followed by bulrush millet. The sowing of millet with arhar(cajanus)indicus) serves as an insurance against the vagaries of the weather. If the rainfall is deficient, the plants draw the water supply from the subsoil through their deep roots, but if the rainfall is excessive, the sandy soil drains quickly and the plants are

not threatend with waterlogging.

Besides food cereals, ground nuts mixed with pulses are mainly grown for cash on light sandy soil. They are not only the source of oil, but also the source of food for the poor. Usually in the month of December, a few villagers take the raw nuts by heating them. Generally ground nuts are sold in the market of Shivarajpur from where they are sent to the city.

Fodder covers about 2.5 per cent of the net cropped area and the main fodder crop is juar(sorghum Vulgare). The area under fodder may be extended as there is a lack of pasture land in the village.

A comparison of Figs. 106 and 109 indicates a close influence of soil on the crop pattern. Maize and fodder occupy usually the good quality lands (A) situated at the close of the village, while other crops occupy generally the medium quality lands, where the soil is sandy and less manured.

47.42 per cent of the gross cultivated area is left fallow in the kharif season for these lands are capable of producing only one crop a year.

In the year of inquiry, the Writer came to know from the villagers that the rotation of the crop is generally practised in the following order. On these medium quality lands, which were deveted to millets and pulses for the first year in the kharif, pulses were continued in the rabi season but in the second year these

fields were left fallow in the kharif but barley or barley and gram were grown in the rabi season.

Land Utilization in the Rabi Season

The use of land in the rabi season of 1960-61 is represented in Fig. 110. The area occupied by each crop is mentioned in the following Table.

Table LXXXX

Gross cultivated area 224.50 acres
Net cropped land in the rabi season 154.22 acres

Crops	Area in Acres	Percentage of gross cultivated land	Percentage of net cropped land	Total percentage of gross cultivated land	Total percentage of net cropped land
GRAIN CROPS:				52.12	75.90
Barley & Gram	74.92	33.37	48.58		
Wheat & Gram	26.60	11.84	17.25		
Barley	6.91	3.08	4.48		
Wheat	5.99	2.66	3.88		
Wheat & barley	2.63	1.17	1.71		
OTHER CROPS:				16.55	24.10
Oil seeds	37.05	16.50	24.02		
Potatoes	0.12	0.05	0.08		
Continual kharif crops	67.15	29.94	..	29.94	
Fallow	3.13	1.39	..	1.39	
Total	224.50	100.00	100.00	100.00	100.00

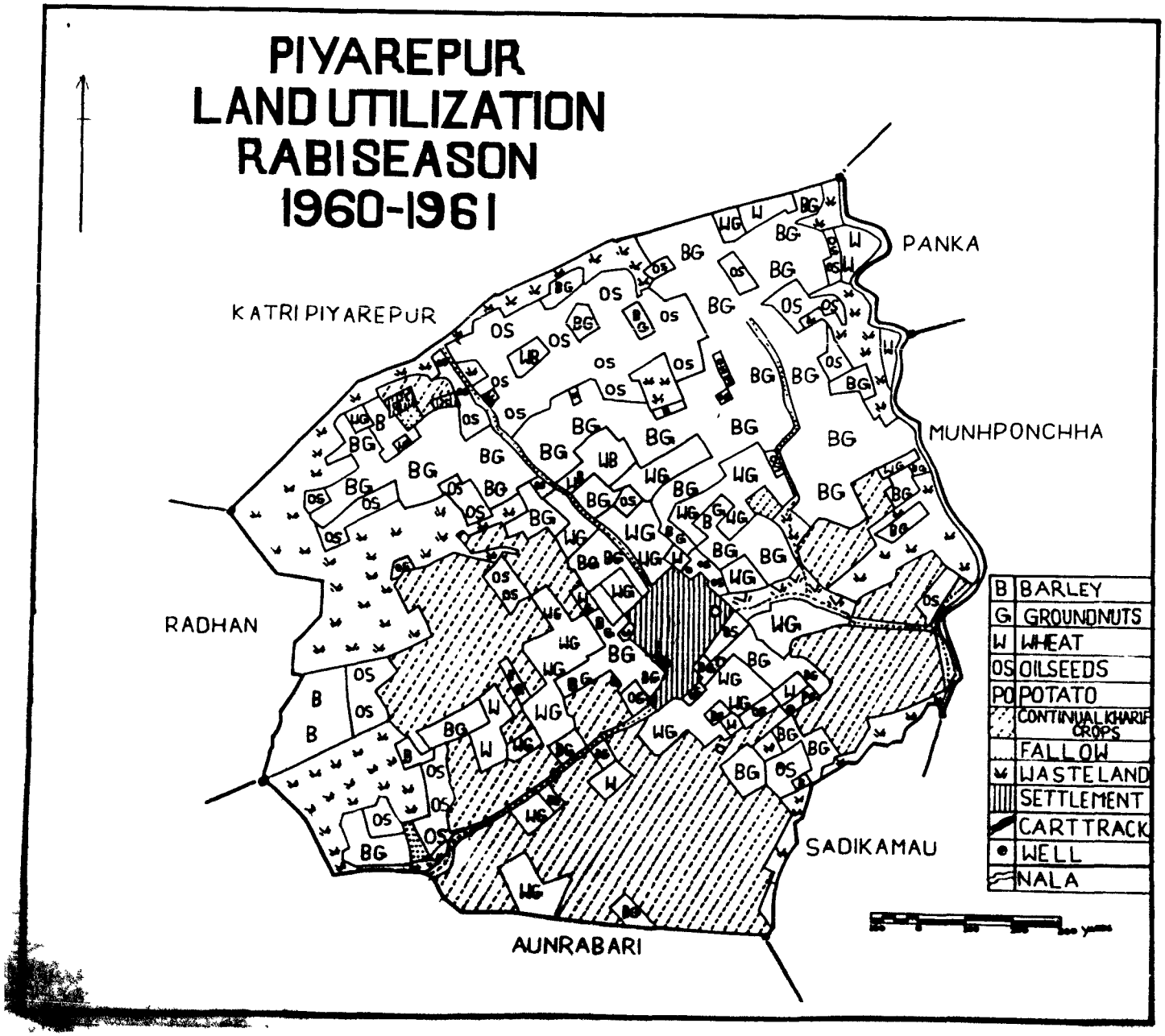
PIYAREPUR
LAND UTILIZATION
RABI SEASON
1960-1961
KATRI PIYAREPUR
PANKA
MUNHPONCHHA
RADHAN
SADIKAMAU
AUNRABARI
B BARLEY
G GROUNDNUTS
W WHEAT
OS OILSEEDS
PO POTATO
CONTINUAL KHARIF CROPS
FALLOW
WASTELAND
SETTLEMENT
CART TRACK
WELL
NALA

Fig. 110

It will be seen from Table LXXXX that grain crops occupy three-fourths of the net cropped land in the rabi season. Gram mixed with barley (known as 'bejhar) is the major crop occupying about 49 per cent of the net cropped area in the season. The crop is followed by the wheat and gram, which itself covers another 17 per cent of the net cropped land.

It is remarkable that pulses which were grown either mixed with millets, or, with groundnuts still cover a little less than one third of the gross cultivated area. Besides food crops, oil seeds (Sarson and Lahi) cover about one-fourth of the net cultivated area in the season, and they are grown on light sandy loam soil. The crop sown as a sole crop, has its outstanding importance in the village, as it is grown on the moisture retained soil without providing the facilities of irrigation. The oil may be extracted from the seeds and sold in the neighbouring market of Shivrajpur while oil cake forms good cattle food.

Double Cropped Land

The total of the double cropped land in the year 1960-61 is 47.99 acres or 21.37 per cent of the gross cultivated land. Double cropped areas are in general confined to the good quality lands lying close to the settlement.(Fig.lll). These lands are devoted to maize and fodder in the kharif and to wheat or wheat and gram or barley and gram in the rabi season. The soil of B lands is less pro-

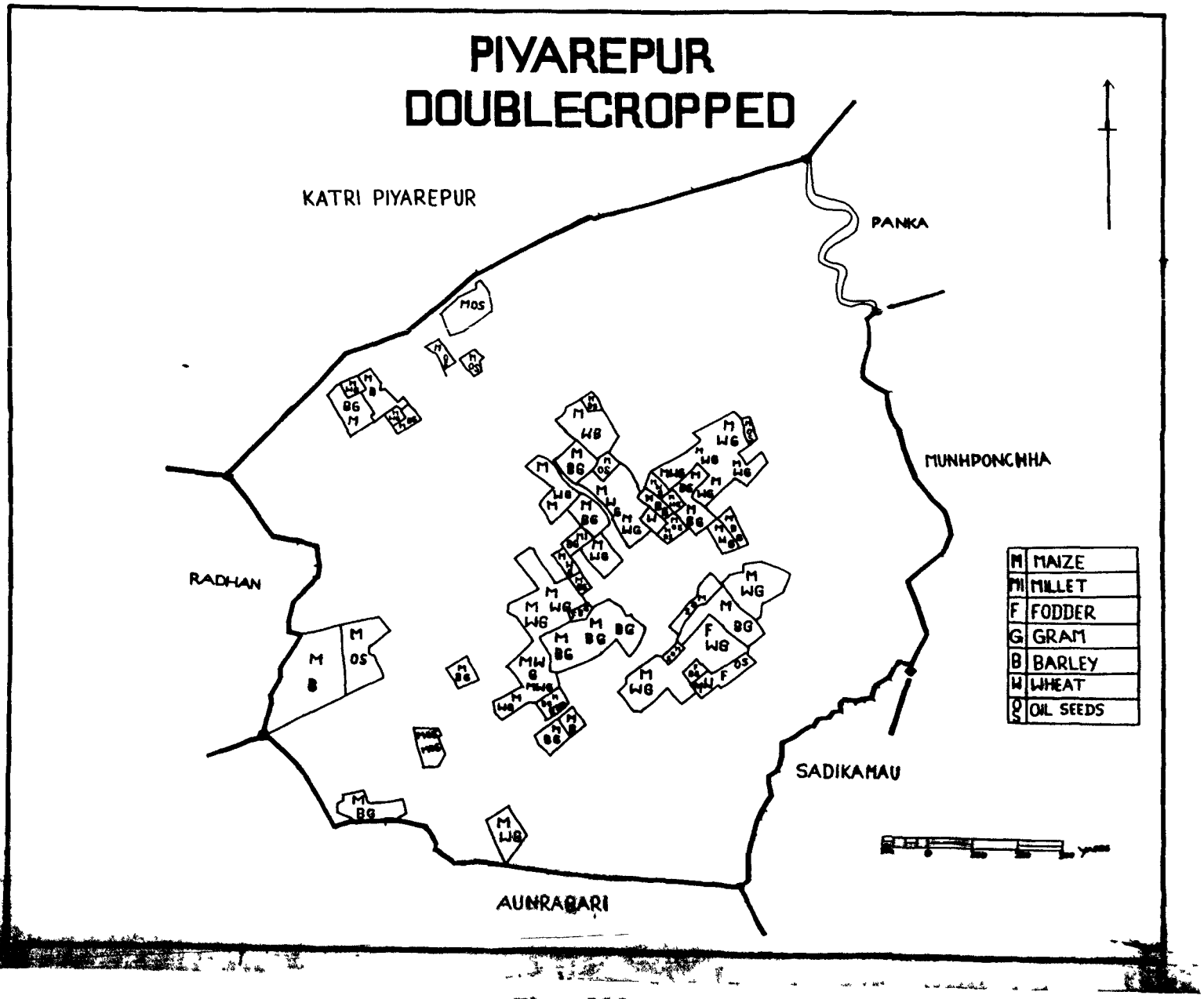
PIYAREPUR
DOUBLECROPPED
KATRI PIYAREPUR
PANKA
MUNHPONCHHA
RADHAN
SADIKAMAU
AUNRAGARI
M MAIZE
MI MILLET
F FODDER
G GRAM
B BARLEY
W WHEAT
OS OIL SEEDS

Fig. 111

ductive and without adequate manure does not yield two crops a year.

Land use and Population

The following Table shows the totals of various classes of land as well as the per capita share of the villages in these lands.

Table LXXXXI

Total populati n of the village depending upon the produce of the village-211[1]

	Total area of the village	Total available land for cultiva-tion	Net cropped land in the kharif season	Net cropped land in the rabi season	Total cultivated land(both of kharif and rabi	Drouble cropped land
Area in acres	284.61	224.50	118.03	154.22	272.25	47.99
Land per head of population	1.35	1.06	0.56	0 .73	1.29	0.23

The above Table shows that the per capita cultivated land available in the village is 1.06 acres. In the kharif season the per capita net cropped land is reduced to about half of the total, while in the rabi season it is 0.73 acre. The decrease in the

(1) The total population, as enumerated in March 1961 is 191. and 20 persons of the outside village also depend upon the produce of the village.

per capita cultivated land in the kharif season is due to the practice of following, while in the rabi season the reduction is due to the continual kharif crops.

Table LXXXXI further shows that the per capita double cropped land is 0.23 acre, and thusthe per capita gross cultivated land is 1.29 acre or the amount of land supporting one person is 1.8 acre. Thus, it seems that the village is not only self sufficient in its produce, but also exports[1] some of the cereals in moder-ate quantity.

As far as the occupational structure of the population is concerned, 176 persons[2] (about 84 per cent of the total population) belong to the primary rural group and depend exclu-sively upon land, while 16 per centof the populatin is secondary rural, which serves the primary rural group and indirectly depends upon land.

[redacted]

(1) Exports of the cereals have been given in the tables showing food balance sheets of Piareypur prepared by the Writer on page....

(2) Data based upon the personal inquiry of the Writer.

C H A P T E R IX

GROUP IV : YAMUNA UPLAND (with Kabar)

Chaturi-ka-purwa

LAND UTILIZATION IN CHATURI-KA-PURWA(CHATURIPUR)

Location

The village of Chaturi-ka-purwa is situated in $26^{0}3'$N latitude and $80^{0}15'$E longitude, at the distance of nine and thirty five miles south-east from the headquarters of tahsil Ghatampur and district Kanpur respectively. Lying in the south-eastern extremity at the barders of the district of Kanpur and Fatehpur, the village is bounded by the villages of Dhamna and Chaparhata in the north, Gohrari of the Fatehpur district in the east, Birla Khurd in the south, Gauri in the south and south-west and Harbaspur in the north-north-west.

The village is located in the upland plain of the river Yamuna. River Dakhini Non flows at a distance of 3 miles towards the south of the village and meanders in south-easterly direction towards the Fatehpur district. Numerous seasonal ponds are

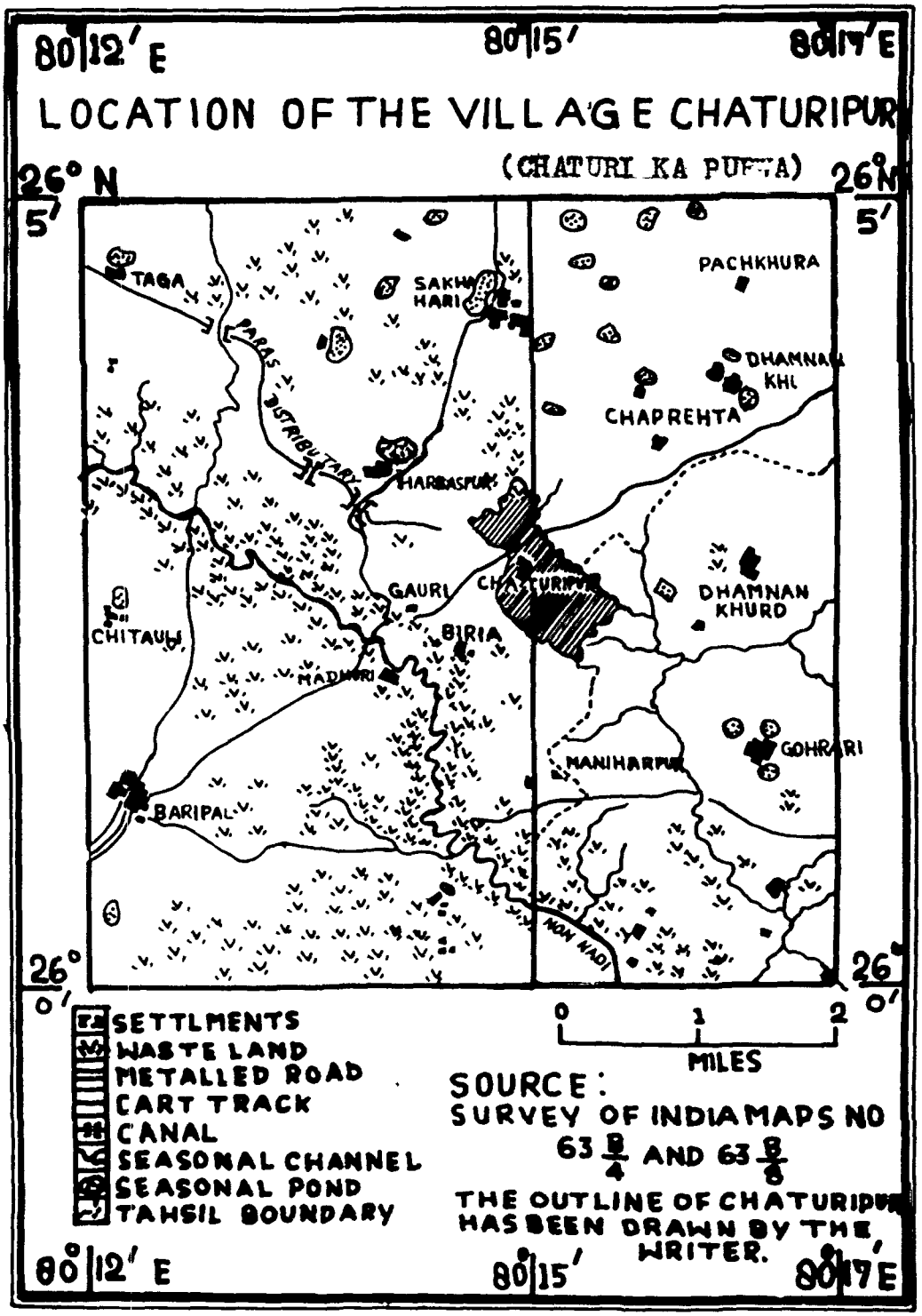
80°12′ E
80°15′
80°17′ E
LOCATION OF THE VILLAGE CHATURIPUR
(CHATURI KA PURWA)
26° N
5′
26° N
5′
TAGA
SAKHU HARI
PACHKHURA
DHAMNAU KHL
CHAPREHTA
HARBASPUR
GAURI
CHATURIPUR
DHAMNAN KHURD
CHITAULI
BIRIA
MADHORI
GOHRARI
MANIHARPUR
BARIPAL
NON NADI
26° 0′
26° 0′
SETTLMENTS
WASTE LAND
METALLED ROAD
CART TRACK
CANAL
SEASONAL CHANNEL
SEASONAL POND
TAHSIL BOUNDARY
0 1 2
MILES
SOURCE:
SURVEY OF INDIA MAPS NO
63 B/4 AND 63 B/8
THE OUTLINE OF CHATURIPUR
HAS BEEN DRAWN BY THE
WRITER.
80°12′ E
80°15′
80°17′ E

Fig. 112

common feature of the plain. These ponds represent cracks in the soil, which are filled with water in the wet monsoon months, but retain little water in the hot weather season.

A cart track connects the village with the important markets of Kora Jahanabad and Baripal(Fig.112). Kora Jahanabad is about 9 miles towards the north-east of the village, which lies in the Fatehpur district, while the latter is about 8 miles in the south-west of the village, which is the railway station of Kanpur-Banda loop of the Central Railway. Another cart track running through the villages of Gauri and Harbaspur, joins the Meghal Road at Nauranga, lying about 8 milles in the north of the village. During the wet monsoon months these cart track become very muddy and almost impassable, the soil of the village is black clay known as kabar, which becomes sticky during the rains, it is difficult to traverse. But when it is dry, it becomes stiff and breaks into a large number of fissures. These characteristics of the soil render the means of communication difficult..

Climate

No climatic data are recorded in the village. The data of rainfall recorded at the headquarters of Tahsil Ghatampur about 9 miles to the north-west of the village have, therefore, been given in Tables LV and LVI in the discussion of the village Kunwarpur on pages 164-165. The same climatic data may be taken as close approximation for the village.

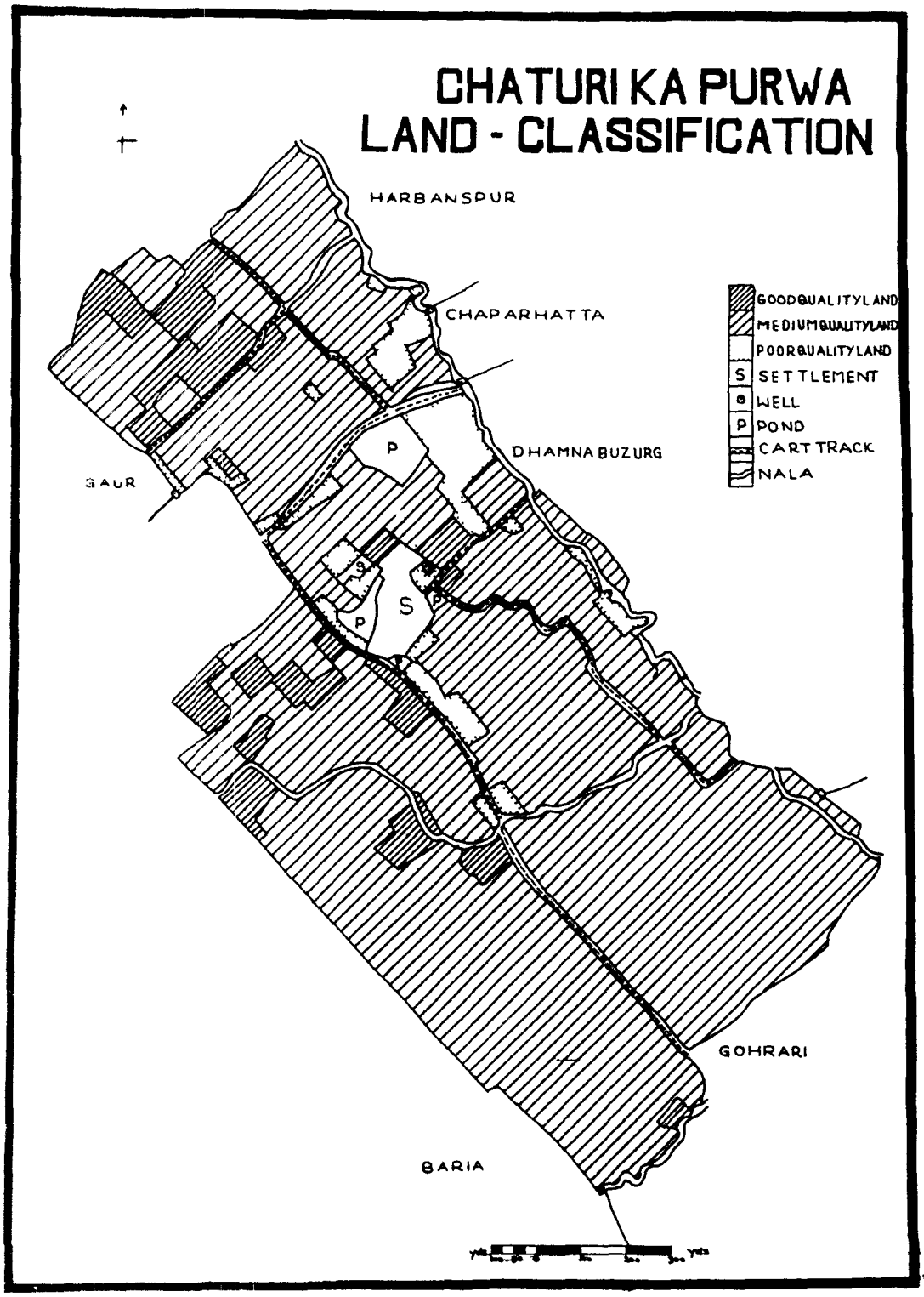
CHATURI KA PURWA
LAND - CLASSIFICATION
HARBANSPUR
CHAPARHATTA
DHAMNA BUZURG
GAUR
GOHRARI
BARIA
GOOD QUALITY LAND
MEDIUM QUALITY LAND
POOR QUALITY LAND
S SETTLEMENT
WELL
P POND
CART TRACK
NALA

Fig. 113

Land Classification

The soil of the area in which the village lies, is usually kabar. But there is some admixture of loam in this soil. On the basis of fertility and productivity the village fields have been differentiated in Fig. 113. The soil of the good quality lands (A) is kabar, which is mainly confined to the south-west of the village and is used for raising two crops a year: rabi in the kharif and gram or peas in the rabi season. The medium quality lands (B) consist of light kabar, which is locally called 'chunhai' and is less productive than A.[1] The poor quality lands (C) are unproductive and are not utilized due to the presence of kankar of very small size.

Irrigation

The whole of the village, except its south-western portion is without the practice of irrigation in both the seasons of kharif and rabi. The crops are dependent on rainfall in the kharif as well as in the rabi seasons. The Chunhai, a variety of kabar soil on account of its high moisture retaining capacity, does not need irrigation either in the kharif or in the rabi season if the amount of rainfall is sufficient and well-distributed during the kharif months. So none of the kharif crops except rice broadcast and

(1) Chunhai is not so dark as kabar. There is an admixture of loam also in it but the proportion of loam is small in amount. It is also stiffer and more difficult to work.

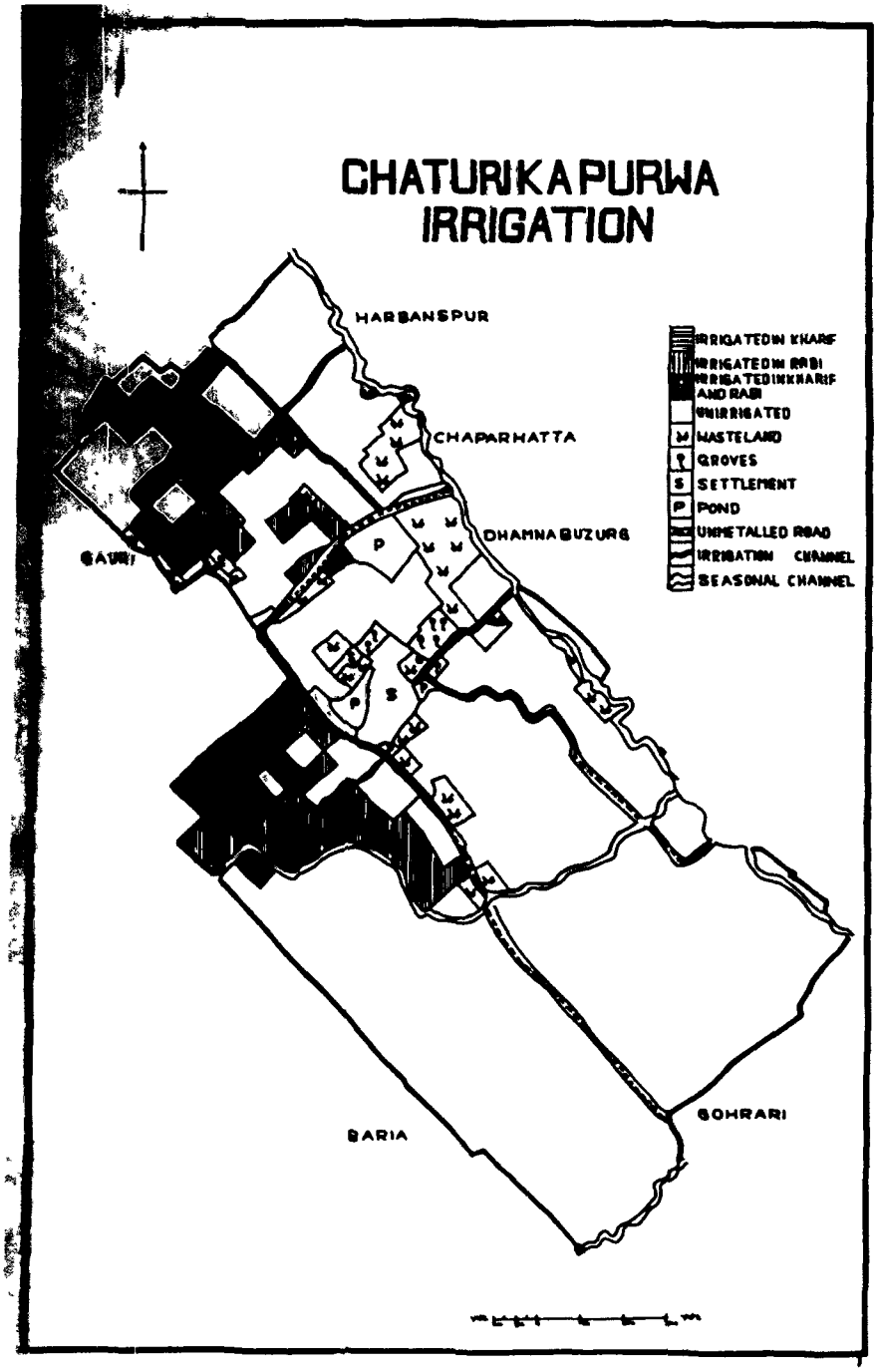
CHATURIKA PURWA
IRRIGATION
HARSANSPUR
CHAPARHATTA
DHAMNA BUZURG
GAURI
BARIA
GOHRARI
IRRIGATEDIN KHARIF
IRRIGATEDIN RABI
IRRIGATEDIN KHARIF AND RABI
UNIRRIGATED
WASTELAND
GROVES
SETTLEMENT
POND
UNMETALLED ROAD
IRRIGATION CHANNEL
SEASONAL CHANNEL

Fig. 114

sugarcane , which are usually confined to the sout-west of the village, was irrigated (Fig.114). Irrigation in the south-west part of the village is carried on mainly from the canal minor of the Paras distributary of the Fatehpur branch of the Lower Ganga Canal. Canal-irrigation is at present of little significance as the canal minor is entirely out side the village and the villagers have to face a great problem in carrying water by the irrigation chennels from such a long distance. Some times they can not even get the chance to have sufficient water to irrigate their fields.

Villagers irrigate wheat fields lying in the middle of the village by ponds applying the swing basket method during the rabi season. But only a few ponds provide the facilities of irrigation and they are also of little value for irrigation when the rainfall is deficient. Irrigation by wells is impracticable as the construction of well is very expensive due to stiffy nature of the soil.

On the whole, the vital problem of the village is scarcity of irrigation. The methods of irrigating the fields as described above is not an insurance against failure of monsoon, which is found in the dry villages lying towards the west of the village of Chaturi-ka-purwa in the district.

Land Utilisation

The land use of the village in 1960-61 is represented in Figs. 115 to 118 which are based on the Writer's field work in the village.[1] The following Table gives a summary of the proportions of the village lands devoted to various uses in 1960-61.

Table LXXXXIII

Total area of the village ----303.22 acres

Use of land	Area in acres	Percentage of the total area
Cultivated land	276.04	91.04
Grove	1.92	0.68
Wasteland	10.73	3.54
Settlement	3.95	1.30
Road	4.48	1.48
Pond	3.59	1.18
Seasonal channel	2.51	0.83
Total	303.22	100.00

The above Table shows that 91 per cent of the total land of the village is under plough, 3.5 per cent is devoted to non agricultural uses, 2 per cent is occupied by water features, while wasteland accounts for 3.5 per cent of the total area

(1) The base map showing the fields and their areas in acres was obtained from the lekhpal of the village concerned. The village was visited

Contd...2

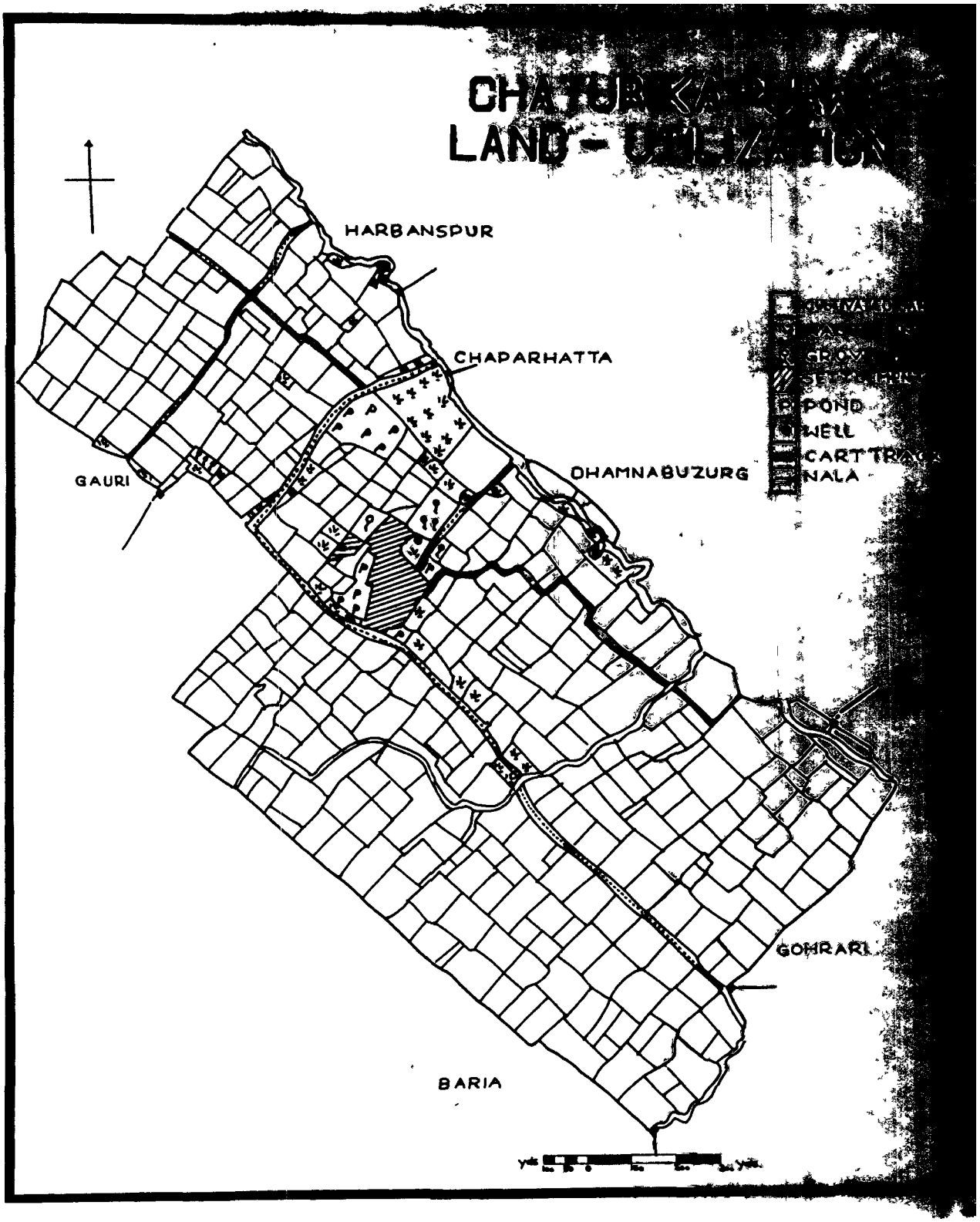
HARBANSPUR
CHAPARHATTA
GAURI
DHAMNABUZURG
POND
WELL
NALA
GOHRARI
BARIA

Fig. 115

and is not utilized. The areaunder groves is negligible due to the stiffness of the soil, which makes the penetration of the roots difficult.

It appears from the comparison of the Figs. 113 and 115 that there is no distinction as such between the size of the good and medium quality lands. The quality of the land, more ever, can be determined on the availability of water supply to the fields.

Plots are generally small in size and they are scattered into different parts of the village. The following Table shows different size-groups of plots in the village.

Table LXXXXIV

Size of plots	Number of plots of each size	Percentage of plots of each size in the total number of plots
Below 0.50 acre	153	35.3
0.50 acre to 1.0 acre	178	41.1
1.0 acre to 2.0 acres	96	22.2
2.0 acre to 3.0 acres	4	0.9
Over 3 acres	2	0.5
Total	433	100.00

Contd..by the Writer in the kharif season of 1960 and the rabi season of 1961 and the use to which each field was being put was recorded on the base map. From these data Figs. 115 to 118 were prepared.

It will be seen from the Table LXXXXIV that the number of plots varying between 0.50 and 1 acre is 178 or 41 per cent of the total number of plots. Another 35.3 per cent of the total number of plots are below 0.50 acre. 96 plots or 22.2 per cent of the total vary between 1 and 2 acres, while only 6 plots are above 2 acres in size.

Land Utilization in the Kharif Season

Fig. 116 illustrates the use of land in the kharif season of 1960. The area occupied by each crop is shown in the following Table.

Table LXXXXV

Gross cultivated area 276.04 acres
Net cropped area in the Kharif Season 130.57 acres

Crops	Area in acres	Percentage of gross cultivated area	Percentage of net cropped area	Total percentage of gross cultivated land	Total percentage of net cropped land
GRAIN CROPS :				43.85	94.13
Rice(broadcast)	17.52	6.34	13.95		
Millets & Pulses	99.42	36.02	76.91		
Maize	3.24	1.17	2.58		
Small Millet	0.87	0.32	0.69		
OTHER CROPS:				3.46	5.87
Sugarcane	0.43	0.16	0.35		
Sweet potatos	0.10	0.04	0.08		
Sesamum(Til)	0.95	0.34	0.76		
Sanhemp	1.01	0.37	0.80		
Fodder	7.03	2.55	3.88		
Fallow	145.47	52.69	..	52.69	..
Total	276.04	100.00	100.00	100.00	100.00

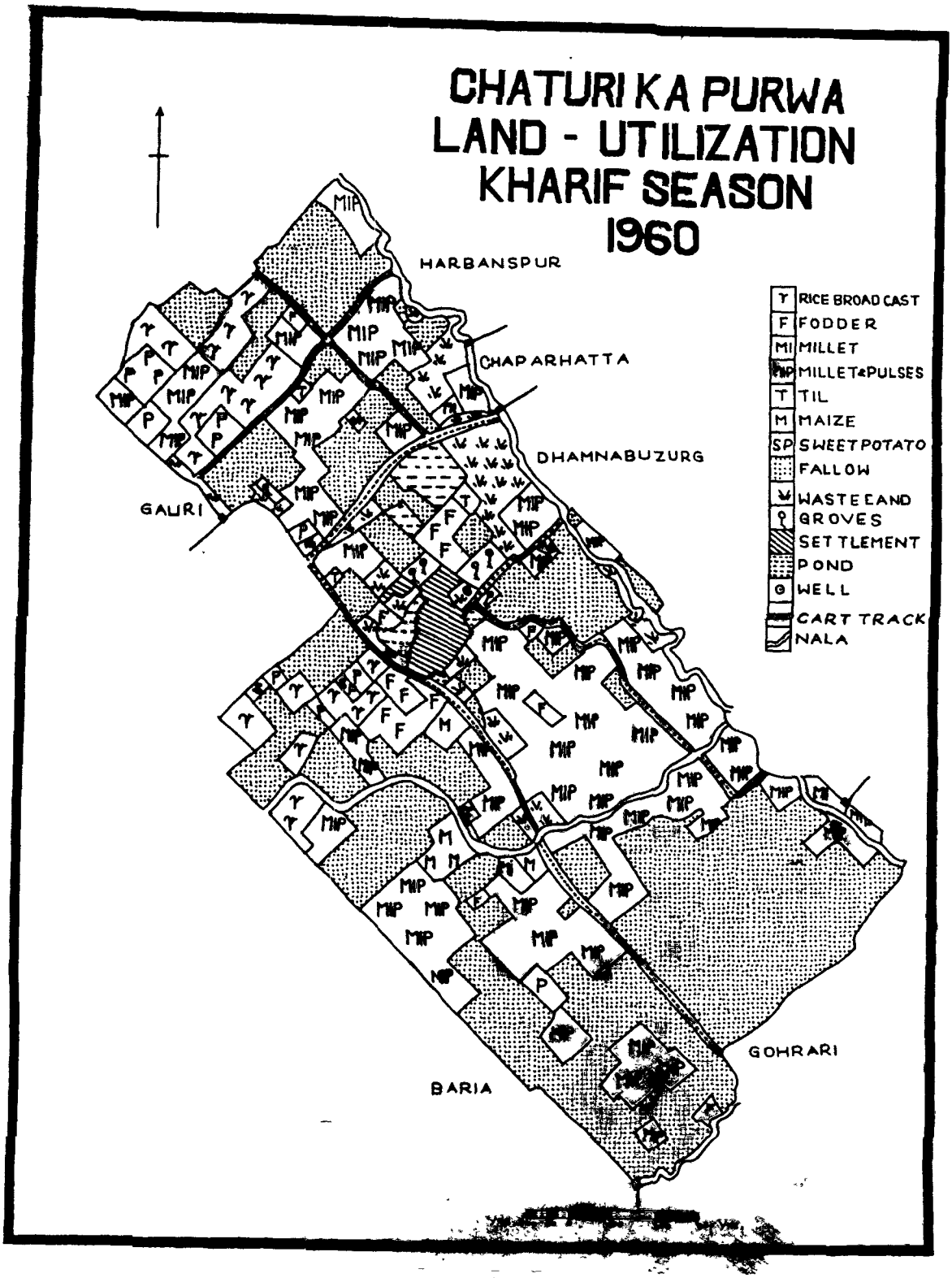
CHATURI KA PURWA
LAND - UTILIZATION
KHARIF SEASON
1960
HARBANSPUR
CHAPARHATTA
DHAMNABUZURG
GAURI
GOHRARI
BARIA
RICE BROAD CAST
FODDER
MILLET
MILLET&PULSES
TIL
MAIZE
SWEET POTATO
FALLOW
WASTE LAND
GROVES
SETTLEMENT
POND
WELL
CART TRACK
NALA

Fig. 116

It is clear from Table LXXXXV that a little more than half of the arable land is left fallow in the kharif season. A comparison of Figs. 113 and 116 will show that the fallow lands consist of medium quality lands and produce only one crop a year.

Table LXXXXV further shows that rice broadcast and millets mixdd with pulses are the major crops in the kharif season of which the former accounts only one-seventh of the net cultivated area while the latter covers about a little more than three-forths of the net cultivated land.

A comparison of Figs. 114 and 116 shows a close influence of irrigation and soil on the crop pattern. Rice broadcast and fodder occupy mostly the good quality lands in the south-west of the village, where the crops are benefited by the facility of canal irrigation to some extent. Sawan is also grown in the small quantity. The crop does best on the light soil of the medium quality land and requires less amount of rainfall.

Land Utilization in Rabi Season

The use of land in the Rabi Season of 1960-61 is mapped in Fig. 117 and the Table LXXXXVI shows the relative importance of different crops:-

Table LXXXXVI

Gross cultivated area	276.04 acres
Net cropped area in the Rabi Season	160.38 acres

Crops	Area in acres	Percentage of gross cultivated land	Percentage of net cropped land	Total percentage of gross cultivated land	Total percentage of gross cultivated land
GRAIN CROPS:				58.07	99.93
Wheat	11.38	4.12	7.43		
Wheat & Gram	64.56	23.38	39.40		
Barley and Gram	62.63	22.68	40.91		
Peas	14.32	5.19	7.36		
Gram	6.76	2.44	4.42		
Barley	0.63	0.26	0.41		
OTHER CROPS:				0.04	0.07
Oil seeds	0.10	0.04	0.07		
Continual kharif crops	99.85	36.18	..	36.18	..
Fallow	15.81	5.71	..	5.71	..
Total	276.04	100.00	100.00	100.00	100.00

The above Table indicates that gram mixed with barley is the major crop and by itself covers more than two-fifths of the net cropped land, while wheat mixed with gram comes in the second place and occupies another 39 per cent of the net cropped area. Other crops are wheat, peas and gram, which occupy the good quality lands.

Table LXXXXVI further shows that mixed cropping is an important feature of the village, as by the use of the mixture of either gram and barley or gram and wheat, it is possible

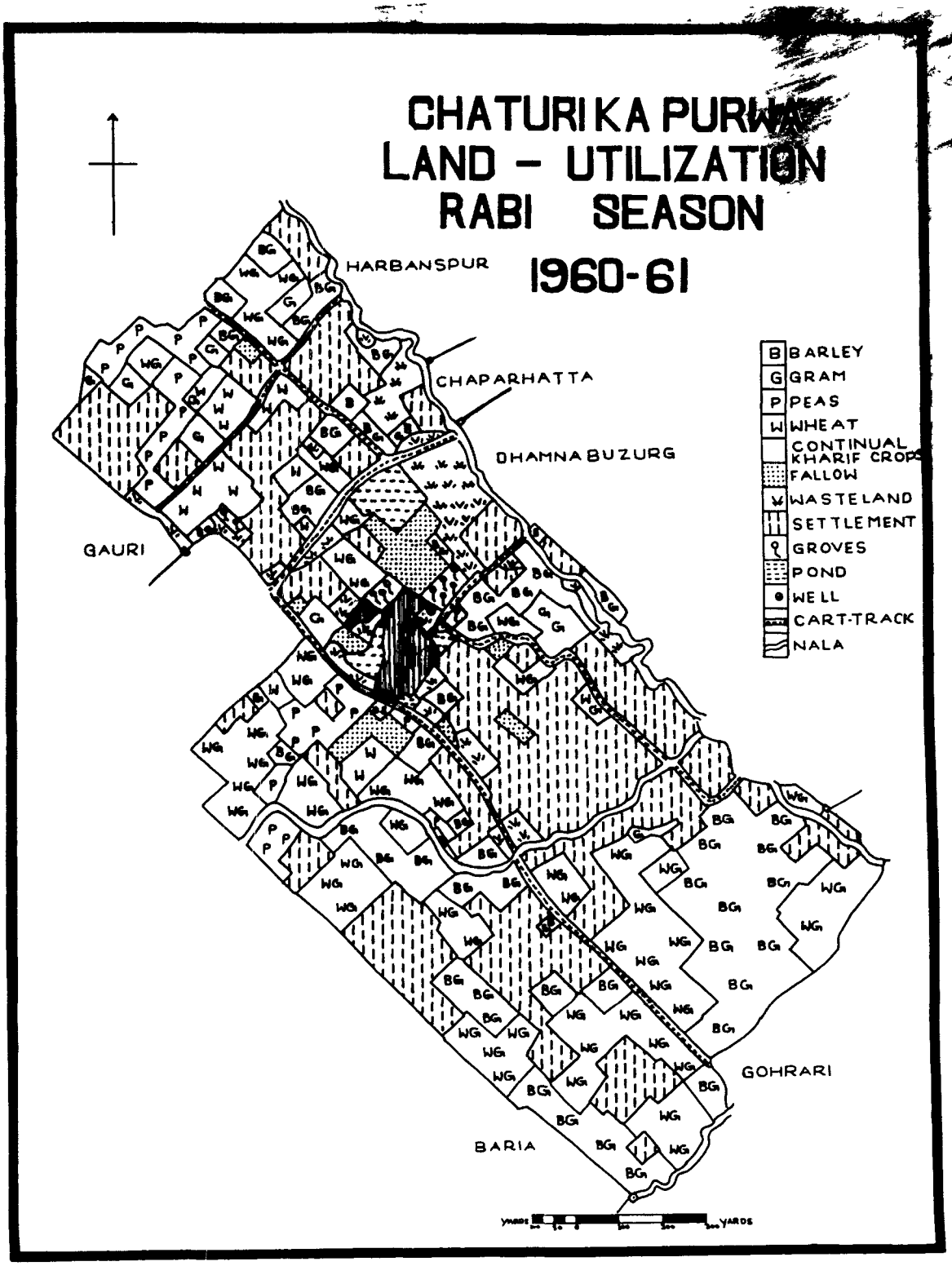
CHATURIKA PURWA
LAND - UTILIZATION
RABI SEASON
1960-61
HARBANSPUR
CHAPARHATTA
DHAMNA BUZURG
GAURI
GOHRARI
BARIA
B BARLEY
G GRAM
P PEAS
W WHEAT
CONTINUAL KHARIF CROPS
FALLOW
WASTELAND
SETTLEMENT
GROVES
POND
WELL
CART-TRACK
NALA
YARDS

Fig. 117

to keep up the supply of combined nitrogen in a way that would be inconvenient on small holdings, if crops were not mixed. Gram is a pulse type of crop, which can also grow well with only a small moisture supply and a little tillage.

A comparison of Figs. 113 and 117 further shows the close influence of soil on land use in different crops. As the soil is light, dry and unirrigated the coarse crops like Gram and Barley, Gram and Wheat, Gram as a single and Barley are grown on the medium quality land. Wheat only comprises 11 acres of land or 4 per cent of the gross cultivated area in the rabi season.

Double Cropped Land

The total of the area cropped twice in the year 1960-61 was 14.91 acres which accounts for 5.40 per cent of the gross cultivated land. Rice broad-cast grown in the kharif is followed by peas or gram in the rabi, when the land is fit for sowing. The area under double cropping would be extended with the provision of canal irrigation in the village.

Land use and Population

The total of the various classes of land and per capita area of the villagers in them have been shown in Table LXXXXVII.

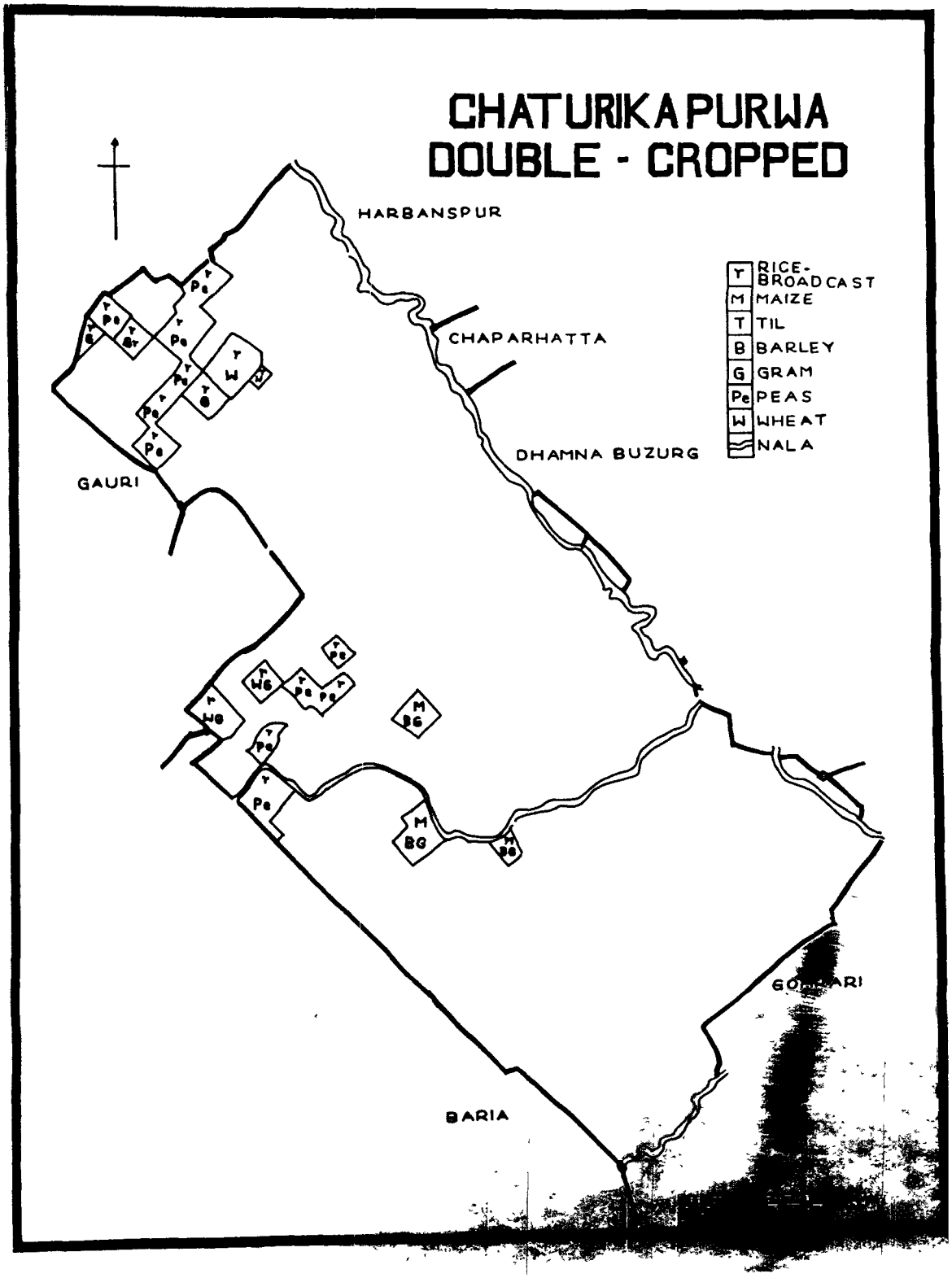
CHATURIKA PURWA
DOUBLE - CROPPED
HARBANSPUR
CHAPARHATTA
DHAMNA BUZURG
GAURI
BARIA
Y RICE-BROADCAST
M MAIZE
T TIL
B BARLEY
G GRAM
Pe PEAS
W WHEAT
NALA

Fig. 118

Table LXXXXVII

Total population of Chaturi-ka-purwa actually depending upon the produce of the village---483[1]

	Total area of the village	Total available land for cultivation	Net cropped land in the kharif season	Net cropped land in the rabi season	Total cultivated land(both of kharif & rabi)	Double cropped land
Area in acres	303.22	276.04	130.57	160.38	290.95	14.91
Land per head of population	0.63	0.57	0.27	0.33	0.60	0.03

It will be seen from the above Table that the per capita share of cultivated land in the village is 0.57 acres. In the kharif season cultivated land is reduced to 0.27 acre, while in the rabi season it is 0.33 acre. The decrease in the per capita cultivated land in the kharif season is due to the practice of fallowing, while decrease in the rabi season is due to the cultivation of millets mixed with pulses.

Table LXXXXVII further shows that the per capita double cropped land is 0.03 acre. Thus per capita share

(1) The actual population of the village as enumerated in 1961 is 526. Number of persons of the out side village depending upon the produce of the village 37, Number of persons of the village, who do not depend upon the produce of the village 80. Thus number of persons, who actually depend upon the produce of the village(526+37-80)=483.

in the gross cultivated land is 0.60 acre or the amount of land supporting one person is 0.60 acre only in Chatri-ka-purwa. This is the lowest per capita than the villages of other groups, because the pressure of the population on land is very great. The village is not self sufficient in its produce. The standard of living, observed by the Writer, was low. Productive capacity of the village is also low, which is given in the following Table.

Table LXXXXVIII

Average yield per acre of good form land-800 lb.= 1P.P.U.

Types of land	Area in acres	Average yield in lb. peracr	Productivity rating per acre	Number of P.P.U.
Good quality land(A)	15.34	1600	2	30.68
Medium quality land(B)	260.70	800	1	260.70
Poor quality land(C)	10.73	..	..	...
Total	286.77			291.38

It will be seen from the above Table that 286.77 acres of cultivable land give a total of 291 P.P.U. The scope for increasing the Potential productive units lies mainly in the extension of the area under double cropping which can only be possible

by converting some of the medium quality lands into good quality lands, provided with the facilities of irrigation and adequate supply of manure in the village.

435 persons or about 90 per cent of the total population belong to the primary rural group and 10 per cent of the population is secondary rural, which serves the primary rural population and depends upon them. Thus agriculture is the main occupation of the villagers.

[redacted]

PART - III

CONCLUSIONS

C_H_A_P_T_E_R X
CONCLUSIONS.

(A)

AGRICULTURAL PRODUCTION & NUTRITIONAL REQUIREMENTS

(B)

LAND USE PLANNING

CONCLUSION

(A)

AGRICULTURAL PRODUCTION AND NUTRITIONAL REQUIREMENTS.

The land utilization survey of the fourteen selected villages of the Kanpur district has been discussed in the preceeding chapters. The different uses of land reveal that the existing economy in the district is essentially rural and is dependent upon agriculture. Although a very high percentage of the land is cultivated, which varies between 60 and 94 per cent, yet in every case some amount of land is rendered unproductive and unutilized due to the presence of undesirable quantities of saline efflorescences at or near the surface, ravines with gravelsand gritty soils and low-lying areas along with the rivers with loose sand.

The use of land in the kharif and rabi seasons is dominated by grain crops. Cereals occupy about half of the cultivated area in the kharif season and more than eight-tenths in the rabi season.

In all the villages except Iliaspur and Palikhurd more than 82 per cent of the population is primary rural and depends exclusively on agriculture. The amount of cultivated land supporting one person varies between 0.70 acre to 1.1 acres in eight irrigated villages and from 1.0 acre to 1.3 acres in the unirrigated villages. (Table IC) In the village of Chaturi-ka-purwa, per capita gross cultivated land is only 0.60 acre, where the populati n has a relatively low standard of living.

It shows that the pressure on land is high, which has resulted in the progressive fragmentation of holdings and also has minimised the amount of per capita land available for cultivation.

Agricultural Production and Nutritional Requirements

On the basis of investigations concerning land use and the per capita yields of crops, the Writer has prepared Food Balance Sheets for individual villages to determine the caloric in take per head per day.[1] (Tables CI B to CXIV B). These Tables show

(1) The caloric in take is a measure of general health of a person, because it determines the amount of heat and energy needed by the human body.

that cereals, sweet Potatoes and sugar are the main sources of calories for the people. There are other sources of supplies, for example, the production of mangoes, guavas, waternuts and ground nuts etc., but these are subsidiary and therefore can be left out of calculations. As the people are generally Vegetarians, meat is not one of their sources of caloric requirements. Thus meat can be also omitted from the caloric intake. Table - C shows the comparative figures for the sample villages in respect of the per capita gross cultivated land as well as the caloric intake per head per day. It will be seen from this Table that villages I to VIII, which are irrigated, fall in two distinct categories. Villages I to IV (Daheli, Harbaspur, Khajuri and Pitakpur) are situated in the well drained up land, where the soil is mainly loamy. The caloric intake per head is a little more than 2300. The village of Harbaspur, however, forms an exception because in this village the per capita gross cultivated land is only 0.77 acre as compared to about 0.9 to 1.0 acre for the other villages lying in the same area. As a result of this decrease the caloric intake drops below 2300.

Villages V to VIII (Khondhan, Palikhurd, Kunwarpur and Saruppur) lie in the ill-drained areas, where the soil is clayey to clayey loam, the caloric intake per head is between 2150 and 2250. But in the village of Palikhurd the caloric intake is below 2150, because the per capita gross cultivated land is only 0.60 acre which is less than that of the other villages of this category.

SUMMARY TABLE I

Showing The Per Capita Land in Each Village (Area in Acres)

No.	Name of the Village	Total cultivated land available per head of population	Area per head of population cropped twice a year	Net cropped land in the Kharif per head of population	Net cropped land in the Rabi per head of population	Gross total of per capita cultivated land including the Kharif & Rabi seasons.	Comments
I	Baheli	0.75	0.13	0.49	0.48	0.88	Village I to IV lie in the well drained uplands. The soils are mainly light to heavy loams with small patches of clays. Ponds and canals are the main sources of irrigation for both the Kharif and Rabi Seasons. The gross total of per capita cultivated land varies between 8 and 1.1 acres.
II	Narbaspur	0.63	0.14	0.33	0.44	0.77	
III	Khajuri	0.96	0.14	0.52	0.58	1.10	
IV	Pitakpur	0.82	0.26	0.45	0.63	1.08	
V	Khadhai	0.69	0.37	0.54	0.52	1.06	Village V to VIII are situated in the low lands of ill drained areas of the district the soil is mainly clayey to clayey loam. Kharif and Rabi crops are irrigated by means of canals. The gross total of per capita cultivated land varies between 1.06 and 1.12 acres with the exception of Pali Khurd and Kunwarpur. The lower acreages of Pali Khurd & Kunwarpur are compensated to some extent by the fact that 25.77% and 18.71 % of their cultivated land in the Kharif season are devoted to millets mixed with pulses.
VI	Palikhurd	0.58	0.11	0.32	0.37	0.69	
VII	Kunwarpur	0.64	0.14	0.32	0.46	0.78	
VIII	Saruppur	0.67	0.45	0.55	0.57	1.12	
IX	Hasanpur (Kachhar)	1.44	Nil	0.25	0.71	0.96	Village IX lies in the Ganga Kachhar while village X and XI are situated in the Yamuna Kachhar lands. The soils are sandy to silty loams and un-irrigated. A very remarkable feature in case of the village IX is that per capita acreage of total cultivated land both of Kharif & Rabi is less than the acreage cultivated per head as the land lying to the West of the village was flooded due to heavy rains in the month of October and was not available at the time of sowing of the Rabi crops in 1960-61. These lands have been left fallow for the whole of the year. The yield of village X is the highest due to the occurance of fertile fine silt deposited by the river Yamuna.
X	Akbarpur Kirbal (Kachhar)	0.70	0.01	0.02	0.69	0.71	
XI	Baijasan (Kachhar)	0.86	0.03	0.03	0.86	0.89	
XII	Hiaspur	1.13	0.18	0.72	0.59	1.31	Village XII & XIII are situated on the high bluffs of the Isan and Ganga respectively consisting of sandy soil Bhur is wide spread in the village XII . The fertility of the soil has further reduced by the absence of irrigation (both Kharif and Rabi) with the exception of a few fields. The yield per acre is lower than I to VIII. The gross total of per capita cultivated land is more than an acre.
XIII	Hiraeypur	1.06	0.23	0.56	0.73	1.29	
XIV	Chaturipurwa	0.57	0.03	0.27	0.33	0.60	The soil of Chaturipur is stiff black clay which gets very sticky during the rains while it cracks into fissures in the dry months irrigation is practised to a few fields laying to the West of the village. The gross total of per capita cultivated land is 0.60 acre.

SUMMARY TABLE I A

Showing The Per Capita Land in Each Village (Area in Acres)

No.	Name of the Village	Total cultivated land available per head of population	Area per head of population cropped twice a year	Net cropped land in the Kharif per head of population	Net cropped land in the Rabi per head of population	Gross total of per capita cultivated land including the Kharif & Rabi seasons.	Comments
I	Baheli	0.75	0.13	0.40	0.48	0.88	Village I to IV lie in the well drained uplands. The soils are mainly light to heavy loams with small patches of clays. Ponds and canals are the main sources of irrigation for both the Kharif and Rabi Seasons. The gross total of per capita cultivated land varies between 8 and 1.1 acres.
II	Harbaspur	0.63	0.14	0.33	0.44	0.77	
III	Khajuri	0.96	0.14	0.52	0.58	1.10	
IV	Pitakpur	0.82	0.26	0.45	0.63	1.08	
V	Khondhan	0.69	0.37	0.54	0.52	1.06	Village V to VIII are situated in the low lands of ill drained areas of the district the soil is mainly clayey to clayey loam. Kharif and Rabi crops are irrigated by means of canals. The gross total of per capita cultivated land varies between 1.06 and 1.12 acres with the exception of Pali Khurd and Kunwarpur. The lower acreages of Pali Khurd & Kunwarpur are compensated to some extent by the fact that 25.77% and 18.71% of their cultivated land in the Kharif season are devoted to millets mixed with pulses.
VI	Palikhurd	0.58	0.11	0.32	0.37	0.69	
VII	Kunwarpur	0.64	0.14	0.32	0.46	0.78	
VIII	Saruppur	0.67	0.45	0.55	0.57	1.12	
IX	Rasulpur (Kachhar)	1.44	Nil	0.25	0.71	0.96	Village IX lies in the Ganga Kachhar while village X and XI are situated in the Yamuna Kachhar lands. The soils are sandy to silty loams and un-irrigated. A very remarkable feature in case of the village IX is that per capita acreage of total cultivated land both of Kharif & Rabi is less than the acreage cultivated per head as the land lying to the West of the village was flooded due to heavy rains in the month of October and was not available at the time of sowing of the Rabi crops in 1960-61. These lands have been left fallow for the whole of the year. The yield of village X is the highest due to the occurance of fertile fine silt deposited by the river Yamuna.
X	Akbarpur Kirbal (Kachhar)	0.70	0.01	0.02	0.69	0.71	
XI	Baijamau (Kachhar)	0.86	0.03	0.03	0.86	0.89	
XII	Rasulpur	1.13	0.18	0.72	0.59	1.31	Village XII & XIII are situated on the high bluffs of the Isan and Ganga respectively consisting of sandy soil Bhur is wide spread in the village XII. The fertility of the soil has further reduced by the absence of irrigation (both Kharif and Rabi) with the exception of a few fields. The yield per acre is lower than I to VIII. The gross total of per capita cultivated land is more than an acre.
XIII	Pirayapur	1.06	0.23	0.56	0.73	1.29	
XIV	Chaturipurwa	0.57	0.03	0.27	0.33	0.60	The soil of Chaturipurwa is stiff black clay which gets very sticky during the rains while it cracks into fissures in the dry months irrigation is practised to a few fields laying to the West of the village. The gross total of per capita cultivated land is 0.60 acre.

Villages IX to XI (Bisayakpur Kachhar, Baijamau Kachhar and Akbarpur Birbal Kachhar) lie in the kachhars of the river Ganga and Yamuna, where the soil is mainly sandy silt and the area is unirrigated, the per capita caloric intake is about 2100 for the village of Akbarpur Birbal and a little more than 2100 for the village of Baijamau kachhar, whereas the calonic intake of the village Bisayak pur kachhar is 1898 inspite of the fact that the per capita gross cultivated land is about one acre, which is more than that of the village X and XI. The daily caloric intake is lowest in this group due to preference for cash crops.

Villages XII and XIII lie in the bhur land and are situated on the high banks of the river Isan and Ganga respectively. Soils of these villages are sandy and unirrigated, although the per capita gross cultivated land is over 1.2 acres, the intake is less than 2150 calories.

In the village of Chaturi-ka-purwa (XIV), where the soil is chunhai, a variety of kabar and partly irrigated, the caloric intake is below 1900. The daily intake is lowest in this village as compared to all other villages, because the productive capacity of the soil is less, the yields of different crops are lower as compared to the yields of the other villages(See Table CXIVA and the per capita gross land is also only 0.60 acre.

SUMMARY TABLE 6 SHOWING PER CAPITA ACREAGE AND DAILY CALORIC INTAKE OF THE SELECTED VILLAGES OF THE DISTRICT KANPUR.

S. No.	Village	Acreage cultiva-ted	Total cultd -vated land both of Kharif & Rabi	Calorie intake per head per day	COMMENTS.
I	Daheli	0.75	0.88	2312	Village I to IV are situated in well-drained areas. The soils are loamy with patches of clay. Kharif and Rabi crops are irrigated.
II	Harbaspur	0.63	0.77	2212	
III	Khajuri	0.96	1.10	2347	
IV	Pitakpur	0.82	1.08	2308	
V	Khondhan	0.69	1.06	2221	Village V to VIII are situated in ill drained areas. The soil is mainly clayey to clayey loam. The Kharif and Rabi cros are irrigate
VI	Palikhurd	0.58	.69	2206	
VII	Kunwarpur	0.64	.78	2132	
VIII	Saruppur	0.67	1.12	2258	
IX	Bisayakpur (Kachhar)	1.44	0.96	1898	Village IX to XI lie in Ganga and Yamuna Kachhar. The soil is sandy to sandy silt and unirrigated.
X	Badjamau (Kachhar)	0.86	0.89	2130	
XI	Akbarpur Birbal (Kachhar)	0.70	0.71	2082	
XII	Ikiaspur	1.13	1.31	2032	Village XII and XIII are situated on the high banks of the river Isan and Ganga respectively. Bhur is wide spread,in these villages. The soil is sandy and unirrigated with the exception of some patches.
XIII	Pirapur	1.06	1.29	2133	
XIV	Chaturi-Ka-Purwa	0.57	0.60	1887	Village XIV has black clay locally known as ' Chunhai' a variety of Kabar soil and is not very fertile.

In any case or with any crop, however, the actual amount of all the calories, which has been shown in the Food Balance Sheets, is not available for human food, because some of the food actually produced by the former is wasted in the process of harvesting, in preparation (the milling of grain with varied extraction rates) and in the process of cooking.

It may, therefore, be concluded from the summary Table C that in the irrigated villages of the Kanpur district the caloric intake per person amounts to about 2100 a day, which is the fair standard of nutrition for the villages of the district. This reasonable amount, as it will be seen further from Table C, may be obtained from about one acre of land (taking cultivated land both of kharif and rabi seasons). Thus it is obvious that the carrying capacity of the agricultural land in the villages of the Kanpur district is of the order of one person an acre. Where the caloric intake drops below 2100 a day, both standard of living and standard of health are low.

The daily requirements of calories varies directly with the body-surface, and there is a basic requirement to keep the body alive. On the basis of a number of calculations Professor L. Dudley Stamp has suggested that 1,000,000 Nutrition calories per annum in terms of farm production may be accepted as per unit human food. Taking, however, into consideration a loss of 10 per cent

in harvesting, cooking, and food preparation 1,000,000 Nutrition calories produced become 900,000 calories per year consumed or available for consumption. This is equivalent to 2460 calories a day. Professor L.D. stamp calls this a 'Standard Nutrition' Unit(S.N.U.)[1] This Standard Nutrition Unit is based on a number of considerations as such, the age structure of population, the range of occupations, the weight and height of the people living under the climatic conditions of North-western Europe.[2] It is, therefore, broadly applicable to the countries of North-Western Europe as well as to other parts of Mid-latitudes, where the population consists of mainly Europeans. But in case of the district of Kanpur, which is a small part of Northern India, where the climate is hot and the average height and weight of people is less than that of people of North-Western European countries, an adequate diet would average less than 2460 calories a day.

It is clear from the deductions made by the Writer that in the villages of the Kanpur district, the net caloric intake ranges from 1887 a day (688,755 a year) to 2347 a day (856,655 a year). In no case it reaches the 900,000 calories postulated as the Standard Nutrition Unit.

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(1) L.D. Stamp, our Developing World(London, 1960)P. 110.

(2) It may be urged that the S.N.U. considers only energy. But if the diet is sufficiently and wisely varied, the intake of protein, minerals and vitamins will be adequate, provided the intake of calories is adequate.

The deductions made by Dr. M. Shafi are interesting in this connection. Dr. Shafi suggests that an actual intake of 2000 calories a day, equivalent to a farm production of little over 800,000 calories per annum, which may be usually obtained from one acre of land, would be adequate for the villages of Eastern Uttar Pradesh.[1] Whereas, the deductions made by the Writer indicate that 2100 calories a day equivalent to a farm production of little over 843,000 calories per annum are available from about one acre of land in the Kanpur district, which lies in the central part of the Ganga-Yamuna Doab(Central U.P.). This amount of caloric intake is higher than that of the Standard Nutrition Unit of Eastern U.P. It seems that agricultural efficiency[2] of the Kanpur district is higher than that of the districts of Eastern Uttar Pradesh. Dr. Shafi has made an attempt to calculate the ranking coefficients[3] to measure agricultural efficiency in Uttar Pradesh and his work indicates that the Kanpur district occupies the highest position in

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(1) Shafi, M., Land Utilization in Eastern Uttar Pradesh(Aligarh,1961) p. 222.

(2) The agricultural efficiency can be determined by the measurement of out put per unit area, it can be determined in terms of out put worker and can be also assessed by the value of agricultural out put.

(3) Professor M.G. Kendall of the London School of +Economics has has made an attempt to measure the agricultural efficiency on mathematical basis and has devised a system of 'ranking coefficients,' the purpose of which is to arrange in order any given number of countries growing the same range of crops and then assess their agricultural efficiency. Dr. Shafi has applied also — this technique to calculate the agricultural efficiency forU.P.

this respect among the districts of the state of Utter Pradesh. The agricultural efficiency of Eastern Uttar Pradesh is only one-third of Kanpur.[1] It means, the production of food per cultivated acre is highest in the district, where the soil in general is more fertile than in the rest of the Eastern Uttar Pradesh and agriculture is more secure on account of canal irrigation. But in case of Japan the agricultural efficiency is very high. With double and treble cropping some of the rice-lands of Japan support as many as six or seven persons per acre. In other words, Japan can produce 6 or 7 S.N.U. per acre, while in some of lands of U.S.A., 2.5 acres of land produces one S.N.U. or supports one person.[2]

In conclusion, if 2100 calories per head per day istaken as the average requirement for the villages of the Kanpur district, it will be seen that ten out of fourteen villages are on the safe side, while four of them usually do not find sufficient food requirements to support their people.

It may here be pointed out that the caloric intake is not a complete guide to health. It does not reveal the level of subsitence. However, the caloric intake is a useful unit with which the actual out put of farm land can be measured, provided

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(1) Shafi, M, The Measurement of Agricultural Efficiency in Uttar Pradesh, Economic Geography Vol. XXXVI No. 4(Clark University U.S.A. 1960) p. 304.

(2) L.D. Stamp, our Developing World (London,1960) p. 113.

the exact details of out-put are avilable. Caloric intake and the carrying capacity of the land, may therefore be useful in planning the land use and the out put an across qualitatively and quantitatively.

(B)

LAND USE PLANNING

Land use Planning is in essence the right and balanced allocation of land between rival claimants.[1] It is the determination of the optimum use of every acre of land. The land of the district should be so used as to satisfy the proper nutrition of the people. It can be only possible by increasing the agricultural production of the Kanpur district. The agricultural production of the district can be increased in two ways: (i) In width by increasing the cultivated area and (ii) in depth by a more intensive use of cultivated land.

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(1) L. Dudley Stamp, Applied Geography (London, 1960). Ch.VII p.65.

The cultivated area can be extended by following the principle of optimal use for every acre of land and, thus, ultimately there should be no waste land. Every part of land should perform some function in the district economy. Usar and ravines are the existing wastelands in the district and ultimate solution for utilizing them lies in the reclamation. Land utilization survey of the fourteen selected villages reveals that the extent of usar is much greater in the villages lying in the ill drained tracts than in the villages lying in the well drained lands.

Generally in canal-irrigated villages, which lie in the clayey tracts of the central lowlands of the district, deficient drainage is a great menace. Under ground accumulation of unused water always results in water logging and formation of wide spread swamps. The interruption to natural drainage caused by the banks of canals has meant severe loss for a large number of villages. The inadequate drainage also causes the land to become saturated by saline efflorescence, which is the most important characteristic of usar land.

The first step in checking the usar land is to improve the drainage system so that the surplus water is conducted to the drainage channels. The subsoil water may also be discharged into canal distributaries by pumps. But pumping the subsoil water is rather costly. The prevention of usar formation can be brought about by impounding rain or canal water in places where the water table is

low for washing down the injurious salts. The area can be converted into community ponds used for deep water paddy, for which Japanese method of cultivation may be adopted.

The natural drainage and artificial drainage channels are inadequate to carry the huge volume of water. The improvement of surface drainage would protect enormous quantities of combined nitrogen, which exists in the pore-spaces of the soil and which are destroyed during the rains. The soil texture would also improve and would lead to better crops. The improvement of drainage, would check further extension of the usar land and would lead to a better utilization of the existing cultivated land.

As regards the reclamation of usar lands, it is for the Soil Advisory Service under the State Soil Survey Organization to render advice on problems of reclamation of soils. State Agricultural Chemist, Kanpur may be also consulted in this respect. However, some of the methods employed in the reclamation of usar lands are described in Chapter III on page.....51.....

It has been observed by the Writer that the rapid erosion of soil is proceeding along the river Yamuna, Sengar and the river Rind. Considerable acreage of arable land has been lost to agriculture due to the loss of mature soil by the erosion. The Writer wants to draw the attention of the farmers and authorities that an endeavour should not only be made to prevent future erosion, but also to reclaim the land already lost. The afore said rivers

are generally bounded by cliffs and in case of the river Yamuna these cliffs are 70 to 80 feet high in some places, but cliffs 30 to 40 feet in height are common. The steep slopes near the river are suited for the action of rain and running water through gullies and ultimately ravines are formed. First, there may be the main ravine and subsequently lateral ravines develop and this process goes on repeating until the land is riddled with deep ravines and lost to agriculture.[1] The process is still in operation, which is making the situation worse. These ravine lands can be reclaimed by small manual labour on small scale. The farmers themselves can terrace and ridge the same lands by hired labour. On inquiry from the villagers, the Writer has come to know that some patches of ravine lands in the tahsils of Derapur and Bhognipur have been terraced and brought under cultivation without any loss of soil. But in case the farmers do not possess the financial means to accomplish this reclamation, a little aid either from the Development Blocks or from the Co-operative banks would certainly be helpful. It may be advanced as a grant, subsidy or loan in recoverable in easy instalments. For large scale and quick reclamation there of the use of machinery would be advisable. With the help of Buldozer, some of the ravine lands with steep slopes may be levelled and reclaimed as this method is already being tried in some districts of Punjab. It has already been discussed (chapter III on page.52..) that the outlet of vegetation cover would check the soil erosion. The villager, therfore, can help themselves by planting

(1)Chibber, H.L. The Reclamation of the Ravine lands of the Yamuna, Uttar Pradesh, Bullatin No. 2 (National Geographical Society of India, Banaras(Varanasi) p. 3

quick growing and drought resisting trees along with grasses. The trees would provide them with the timber and fire wood in course of time, which they need so badly. The grasses, with proper control, would form the pasture lands for the cattle.

Practice of Fallowing:

In each village a substantial portion of the arable land is left fallow in the kharif season. It will be seen from the land classification of the selected villages that much of the land is of medium quality (B), which without manure and the facility of artificial irrigation is not capable of producing two crops a year. The practice of fallowing aims at the recuperation of the fertility of the soil but the process exposes the land to sheet erosion in the months of July and August. This practice also reduces the double cropped area and therefore lowers the potential productive capacity of the land. It is, therefore, suggested that some early maturing legumes such as moong type I etc., should be grown. This would raise the fertility of the soil as they would provide nitrogen to the soil. They will also protect the land from the erosion. Long term rotational experiments conducted by the State Soil Survey Organization have shown that the practice helps in the increase of rabi produce to the extent of 10 to 15 per cent.

The Practice of Manuring

The farmers of the villages are not in the habit of manuring their fields regularly and systematically. The main

substances, which the farmers apply to their fields, are night soil, animal excreta, dead leaves and house hold refuse. Human excrement enriches the soils of their fields which are close to the settlement, but there is no arrangement for the making of campost from night soil. Though the value of cattle dung as a manure is well known to the cultivator, yet he burns the dung instead of applying it to the fields due to scarcity of fire wood.[1] An alternative measure for saving the cattle dung is to increase the supply of cheap fire wood. For this purpose, it would be a profitable measure if some of the usar lands after reclamation were planted with trees. Usar lands can be planted with dhak (Butea frondosa) and babul (Acacia arabica), which would be the main source of full supply for the villagers.

Oil cake is another good source of building up soil fertility, which is the good source of combined nitrogen, though its present use is limited to cash crops only. High price and difficulty in procurement are the main obstacles against its general use in villages. There is, therefore, not much chance for its great utilization, until the range of production is so increased as to make it available at a cheap rate every where. Green manuring is, therefore, the cheapest and the best source of building up soil fertility. This can be cheaply obtained by the inclusion of leguminous crops in rotations. Moong (Phaseolus mungo) and lobia are to some extent green manuring crops. The advantages of other suitable green manuring crops

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(1) The local adage says, "Jakrey Khet Para Nahin gobar, wohi kisan ka jano doobar".
The meaning is: The farmer, who does not apply the dung to his field, can not harvest good crops.

have been described in the Chapter VI on page.133.,However, they remain with-in the easy reach of poor farmers, particularly when the supply of farm manure is limited in the district.

Large number of experiments have been conducted by the State Soil Survey Organization both on kharif and rabi crops on cultivators fields as well as state farms in different soil regions of the district and the results have shown that the application of phoshpate fertilizer is profitable mainly in the Ganga-Pando and Pando-Rind up land: tracts with clayey loam and loamy soils respectively, while in the clayey tracts of the central low lands nitrogenous fertilizers such as ammonium sulphate may be applied to the clayey tracts, but for kharif crops ammonium sulphate would not be profitable. Phosphate fertilizers need not be takn on the recent alluvium of the kachhar lands of the river Ganga and Yamuna.[1] These chemical fertilizers would not prove profitable in the villages of Yamuna uplands, as irrigation is sparsely available in those areas and without which the application of fertilizers would not give encouraging yields of crops. However, the appli ation of chemical fertilizers is beyond the means of an ordinary farmer. It is suggested that these fertilizers should be supplied to the farmers at the proper time by service co-operatives and the cost could be recovered after the rabi harvests. Thus they will not only replace the cattle dung, but increase also the yields of certain food grains. It would be better to apply these chemical fertilizers to

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(1) Agarwal, R.R.and Mehrotra, C.L., Soils of Kanpur District, Their Management And Fertilizer Practices(U.P. Soil Survey Organization Department of Agriculture) pp. 6-8.

wheat, rice, maize, sugarcane, vegetables and potatoes.

A broad based programme of extending agricultural facilities through out the district especially in the up lands of Pando-Rind tract should be launched. There is still scope for extending the existing net work of canals. But greater attention should be given to minor irrigation works. It is a happy facter that the Development Block assists the farmers by giving them financial aid for constructing masonry wells but the villages lying in the Pando-Rind tract need special attention in this respect as the major portion of the area is still beyond the reach of canal irrigation. The number of tube wells may be increased in the southern part of the Ganga - Isan and northern part of Isan-Pando tract, where the area is served by the well irrigation by pur method.

The main difficulty in the way of cultivator is his inadequate finance to meet essential productinn requirements such as better implements, adequate amount of fertilizers and manures, better seeds, healthy farm cattle and necessary minor irrigation facilities. Timely supply of credit in kind and cash is therefore of paramount importance. It is the duty of the land mortigage banks and co-operatives to provide necessary long and short term finance in this respect. Co-operative sector, therefore, must play a very important role in increasing the agricultural productivity by providing the cultivator the necessary credit for his production units.

Investigation on land utilization survey of the selected villages revealsthat more than 65 per cent of the total fields are below 1 acre, which represents small and uneconomic size of land holdings. The village land is usually highly fragmentated into tiny holdings. Holdings are also scattered into different parts of the village.[1] Fragmentation is more popular and frequent among the poor peasants than among the richer peasants, who consolidate their lands and try to make cultivation more economic.[2] Holdings on the good quality land are smaller than the holdings on the medium quality lands. The disadvantages associated with fragmentation of holdings are obvious. The fragmented holdings prevent the use of intensive cultivation, (though farmer adopts intensive method of agriculture). However, wastage of land in providing boundary marks leadsto unnecessary disputes and waste of labour and cattle power and result in supervisory and administrative difficulties. However, the scattered distribution of holdings is advatageous in one respect the peasants can grow two or more crops in dispersed fields in different soils and can thus ensure themselves against vagaries of rainfall. If a deficiency or irregular distribution of rainfall damages one crop, there may be favourable returns from the other fields. The scheme of consolidation of holdings with provision of suitable and cheap means of irrigation is the only alternative to stop the process of the division of holdings. The district is fortunate in this respect that a recent scheme

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(1) The Writer has observed that in some villages the farmers are so badly fragmentated that the distance between fields of the same peasant in some cases is sometimes even a mile or more.This means a considerable wastage of labour.

(2) In some villages of the district, some big land holders have consolidated lands with big farmers and the use of tractors is common on these farms.

to consolidate the scattered fields belonging to one single holding is in progress in the Ghatampur tahsil of the district, which will surely revolutionize the agricultural economy of the tahsil. Buttthe success of the scheme entirely depends upon the willing consent of the cultivators, which is not always forth coming. Factors such as land classification (good, medium, poor quality lands), availability of water supply and other allied facters of the geographical environment may also be considered in carrying out the scheme. There is an imperative need of extending the scheme of consolidation into the other tahsils of the district gradually in order to improve the agricultural production and productivity.

In a scheme of reoriented agriculture with particular reference to the under developed economy of the district, the mechanization of agriculture deserves attention. The Writer is of the opinion that mechanization is not applicable in some parts of the district, especially in the central lowlands, where rice is the major crop of the kharif season. Rice does not lend itself to machanization and the operations involved in the cultivation of this crop make it dependent on human labour and also make it necessary that the plots should be small in size to hold up rainfall.

However, after the completion of the consolidation of holdings in the district some big farms can be brought under mechanization. In view of the extension of co-operative farming in the district, the introduction of mechanization may be helpful. But

for the existing small holdings in certain parts of the district, smaller specialized types of modern implements appear to be more useful than large scale farm mechanisation.

It is obvious, that if the farmers adopt all these measures and work in close cooperation, they can put their resources to maximum utilization. The fundamental problem of rapid increase in population vis-a-vis resources of land would be solved by the principle of optimum use of land as well as promoting multiple use wherever possible.

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FOOD BALANCE SHEETS

OF THE

FOURTEEN SELECTED VILLAGES.

Note on the Columns of the Food Balance Sheets[1]

(Tables C I B to CXIV B)

The following note indicates briefly what each column of the "Food Balance Sheet" represents.

Production

The figures in this column show the total production of cereals and sugar in each village in the year 1960-61. These figures are obtained by multiplying the acreage under a crop with the amount of yield per acre.[2] The yield figures for each crop in each village are based on the inquiry of the writer in that village.

Exports and Imports

The figures in the export column are deducted from production, while the figures in the import column are added to the production in arriving at the available supply.

Available Supply

This is obtained by deducting exports or adding imports if there are any.

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(1) The Food Balance Sheets for the selected villages have been prepared by the Writer on the lines of the Food Balance Sheets given by Dr. Shafi in his published work on Land Utilization in Eastern Uttar Pradesh.
(Shafi, M. Land Utilization in Eastern Uttar Pradesh(University of Aligarh,1961) p.229.

(2) Tables CI A to CXIV A show the acre yield of crops for 1960-61

Contd...2

Seeds

The figures representing the quantities used for seeding purposes are based on the seeding rates common in the village.

Food (Gross)

The figures in this column represent the gross quantities available to consumers and these are obtained after deducting the figures of seed from the available food supply.

Extraction Rate

Extraction rates apply to cereals in converting grain to flour and of paddy to hand pounded rice. The extraction rate figure published by the F A O[1] for India have been adopted for computation by the writer.

Food (Net)

Figures in this column represent the net quantities of food available for human consumption, i.e., after the application of extraction rates.

Cont.... and are based on the inquiry conducted by the writer in each village. The data of yield per acre were obtained in Mound and were converted into pounds.

(1) F A O, 'Food Balance Sheets' 1955. The conversion rate of pound to kgm. is 1=0.453 kgm.

Per head Consumption

These columns give the per head consumption of food in kilo-grams, grams and the total caloric value per head per day.[1]

(1) The net quantities of food are converted into kilo-grams and the figure thus obtained is divided by the total population of the village. This gives the per head consumption for the year. The yearly figure is divided by 365 to obtain the daily consumption. The caloric value of the daily supplies is obtained by applying the caloric conversion factors. The caloric conversion factors have been taken from Food Composition Tables for International use F A O (Rome, Italy), F A O Nutritional Studies, No. 3 (Jan. 1953).

TABLE CI A

Village DAHELI 1960--61

Crops	Yield per acre in lb.
Transplanted Rice	1400
Big Millet	820
Bulrush Millet	660
Pulses (Urad)	600
" (Arhar)	660
Maize	820
Sweet Potato	5600
Wheat	900
Wheat & Gram	900
Barley & Gram	980
Gram	600
Peas	600
Barley	820
Potato	6400

TABLE CXB
VILLAGE DAHELI
(In lb.)

Population 477 YEAR: 1960-61

Commodity	Production	Export	Import	Available Supply.	Seed	Food (Gross)	Extraction Rate percent.	Food (Net)	Per Head Consumption Kg. per year.	Gm. per day	calories per day	Comments.
Rice (Transplanted)	60,102	...	...	60,102	3,434	56,668	66 2/3	37,779	35.924	98	352	56 percent of the total caloric intake per head per day is provided by the Kharif crops and 44 percent by the rabi crops. The main supply of caloric intake is obtained from rice, millet, maize and wheat mixed with gram.
Millet(Big)	66,207	26,483	...	39,724	484	39,240	95	37,278	35.448	97	333	
Millet (Bulrush)	6,217	...	...	6,217	19	6,198	90	5,578	5.304	15	54	
Maize	38,835	...	...	38,835	379	38,456	89	34,226	32.547	91	330	
Pulses	43,345	17,338	...	26,007	329	25,678	95	24,394	23.197	64	221	
Sweet Potato	896	...	...	896	...	896	100	896	0.861	2	2	
Wheat	87,669	43,834	...	43,835	9,741	34,094	90	30,685	29.180	80	280	
Wheat and Gram	42,120	...	...	42,120	4,680	37,440	92	34,445	32.755	90	312	
Barley and Gram	43,404	...	...	43,404	4,429	38,975	82	31,960	30.392	83	284	
Gram	6,120	...	...	6,120	816	5,304	95	5,039	4. 792	13	45	
Peas	3,384	...	...	3,384	451	2,933	95	2,786	2. 649	7	24	
Barley	8,635	...	...	8,635	1,053	7,582	70	5,307	5. 046	14	46	
Potato	16,640	...	...	16 ,640	832	15,808	100	15,808	15 .031	41	29	
Total											2,312	

612

TABLE CII A

Village HARBASPUR 1960 - 61

Crops	Yield per acre in lb.
Rice Broadcast	1000
Big Millet	450
Bulrush Millet	400
Maize	500
Pulses (Arhar)	620
Sweet Potato	6400
Sugarcane (Gur)[1]	2400
Wheat	740
Barley and Gram	800
Wheat and Barley	820
Wheat and Gram	740
Gram	660
Peas	820
Barley	900
Potato	6400

(1) The yield is that of unrefined sugar (gur) manufactured from an acre of sugarcane.

TABLE CII B

VILLAGE: HARBASPUR

Population = 522 (1 lb.) Years- 1960-61

Commodity	Production	Export	Import	Available Supply	Seed	Food (Gross)	Extraction Rate Percent	Food (Net)	Per Head Consumption Kg. per Year	Gm. per day	Calories per day	COMMENTS
Rice	74,650	...	...	74,650	5,972	68,678	68 [2] 3	45,785	39.785	109	391	52 percent of the total calorie intake per head is provided by the Kharif crops and 48 percent by the rabi crops. Wheat alone supplies about one fifth of the total intake.
Millet(Hg)	33,872	...	...	33,872	452	33,420	95	31,749	27,957	77	264	
Bulrush Millet	840	...	...	840	4	836	90	752	0.653	2	7	
Maize	3,255	...	...	3,255	52	3,203	89	2,851	2.475	7	24	
Pulses	41,690	4169	...	37,521	269	37,252	95	35,389	30.711	84	309	
Sweet-Potato	16,960	...	...	16,960	...	16,960	100	16,960	14.728	40	38	
Wheat	67,710	...	...	67,710	9,150	58,560	90	57,704	45.737	125	438	
Barley and gram	41,736	...	...	41,736	5,717	36,019	82	30,536	26,500	72	246	
Wheat and gram	18,093	...	...	18,093	2,448	15,648	92	14,396	12.492	34	118	
Wheat and-barley	22,845	...	...	22,845	2,786	20,059	80	16,047	13.925	38	128	
Gram	7,682	...	...	7,682	851	6,831	95	6,489	5.630	15	52	
Barley	1,530	...	...	1,530	170	1,360	70	952	0.826	2	7	
Peas	7,265	...	...	7,265	709	6,556	95	6, 228	5.404	15	52	
Potato	11,520	...	...	11,520	576	10,944	100	10, 944	9.498	25	18	
Sugar (Gur)	14,408	...	...	14,408	...	14,408	100	14, 408	12.504	34	119	
Total											2,212	

TABLE CIII A

Village KHAJURI 1960 - 61

Crops	Yield per acre in lb.
Rice(Broadcast) unhusked	1000
Maize	500
Small Millets	320
Millet	660
Sugarcane (Gur)	2000
Sweet Potato	6400
Wheat	740
Wheat & Gram	740
Wheat & Barley	740
Barley	660
Barley & Gram	660
Gram	590
Peas	820
Pulses	600
Potato	4800

TABLE CXII B

VILLAGE - K H A J U R I

Population 538 (IN Lb) YEAR 1960-61

Commodity	Production	Export	Import	Available Supply	Seed	Food (Gross)	Extraction Rate Percent.	Food (Net)	Per Year Consumption Kg. per year	Gm. per day	Calories per day	COMMENTS
Rice (Broad cast)	5,190	...	...	5,190	415	4,775	64 3	3,183	2,675	7	25	47 percent of the total calories intake per head is derived from the Kharif crops and 53 percent by the rabi crops. Millet and barley mixed with gram are important cereals which supply a little less than one-fifth and about one-fourth of the total respectively.
Maize	19,550	...	...	19,550	313	19,237	89	17,121	14,389	39	142	
Millet(Rg)	101,237	40,498	...	60,742	920	59,822	95	56,831	47,763	131	449	
Bulrush Millet	22,669	4,534	...	18,135	142	17,993	90	16,194	13,610	37	129	
Pulses	92,034	46,017	...	46,017	767	45,250	95	42,987	36,128	99	342	
Sweet Potato	2,496	...	...	2,496	...	2,496	100	2,496	2,098	6	6	
Wheat	61,287	...	...	61,287	8,282	53,005	90	47,705	40,091	110	385	
Barley	1,198	...	...	1,198	190	1,008	70	706	0.593	2	7	
Gram	21,611	...	...	21,611	2,981	18,630	95	17,699	14,875	41	141	
Wheat and barley	15,977	...	...	15,977	2,159	13,818	80	11,054	9,290	25	88	
Wheat and Gram	2,279	...	...	2, 279	308	1,971	92	1,813	1,524	4	14	
Barley and Gram	87,443	...	...	87,443	13,249	74,194	92	68,258	57,387	157	537	
Peas	9,422	...	...	9,422	919	8,503	95	8,078	6,789	19	66	
Potato	3,072	...	...	3,072	205	2,867	100	2,867	2,409	7	5	
Sugar(Gur)	1,660	...	...	1,660	...	1,660	100	1,660	1,395	4	14	
Total											2,347	

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TABLE CIV.A

Village PITAKPUR 1960 - 61

Crops	Yield per acre in lb.
Rice (Broadcast)	820
Millets	450
Bulrush Millet	660
Maize	500
Pulses	800
Wheat	720
Barley and Gram	800
Peas	820
Gram	720
Barley	960
Wheat & Barley	960
Potatoes	4800

TABLE:- C IV B

VILLAGE:- P I T A K P U R

Population:- 448 (In lb.) YEAR:- 1960-61

Commodity	Production	Export	Import	Available supply	Seed	Food (Gross)	Extraction Rate Percent	Food (Net)	Per head consumption			Comments.
									lb. per year	gm. per day	calories per day	
Rice	21,984	2,198	...	19,786	2,145	17,641	66 2/3	11,761	11,893	33	121	44 percent of the total calorie intake per head is obtained from the Kharif crops and 56 percent from the 2 Rabi crops. Barley mixed with gram supplies a little less than one-fifth of the total intake, while the remainder is obtained from other cereals among which millet and wheat are important.
Millet(Rig)	37,868	...	...	37,868	505	37,363	95	35,495	35,890	98	341	
Bulrush Millet	37,978	9,494	...	28,482	115	28,367	95	26,948	27,232	75	261	
Maize	570	...	...	570	9	561	89	499	0.485	1	4	
Pulses	62,730	31,360	...	31,360	314	31,046	95	29,494	29,826	82	283	
Wheat	47,239	...	...	47,239	5,269	41,950	90	37,755	38,177	105	368	
Barley	2,064	...	...	2,064	172	1,892	70	1,324	1,339	4	13	
Gram	28,960	...	...	28,960	2,415	26,545	95	25,218	25,489	70	242	
Wheat and Barley	3,318	...	...	3,318	285	3,033	80	2,426	2,453	7	24	
Barley and gram	61,904	...	...	61,904	6,190	55,714	82	45,685	46,194	126	431	
Peas.	57,474	28,737	...	28,737	4,205	24,532	95	23,315	22,565	62	214	
Potato	3,024	...	...	3,024	101	2,923	100	2,923	2,955	8	8	
Total											2,308	

TABLE CV A

Village KHONDHAN 1960 - 61

Crops	Yield per acre in lbs.
Big Millet (Sown alone)	370
Maize	620
Rice (Transplanted) unhusked	1640
Rice (Broadcast) "	1230
Sugarcane (Gur)	2400
Barley	740
Wheat & Barley	700
Wheat	600
Wheat & Gram	600
Peas	660
Pulses (Arhar)	550
Potatoes	6560

TABLE C V B

VILLAGE: K H O N D H A N

(I K 1h)

Population 350 — Year :- 1960-61

Commodity	Production	Export	Import	Available Supply	Seed	Feed (Gross)	Extraction Rate Percent	Feed (Net)	Per Head consumption Kg. per Year	Gm. per day	Calories per day.	COMMENTS.
Millet(Nig)	7,333	...	...	7,333	79	7,254	95	6,891	8,857	24	82	52 percent of the total calorie intake per head per day is obtained from the Kharif crops and 48 percent from the rabi crops. Rice and wheat supply one third and one-fourth of the total respectively.
Maize	10,968	...	...	10,968	142	10,826	89	9,635	12,471	34	123	
Rice	154,144	102,763	...	51,381	7,519	43,862	66 2/3	29,241	37,828	104	373	
Rice (Transplated)	1,143	12,229	...	46,914	3,977	44,937	66 2/3	29,958	38,826	107	384	
Rice (Broad Cast)												
Pulses	7,920	...	...	7,920	54	7,866	95	7,473	9,669	27	93	
Barley	44,171	...	...	44,171	4,775	39,396	70	27,577	35,691	98	325	
Wheat	57,090	...	...	57,090	7,612	49,478	90	44,530	57,711	158	559	
Wheat and Barley	7,388	...	...	7,388	840	6,548	80	5,238	6,777	19	65	
Wheat and Gram	1,674	...	...	1,674	223	1,451	92	1,338	1,729	5	17	
Peas	7,900	...	...	7,900	718	7,182	95	6,823	8,831	24	83	
Potato	12,136	...	...	12,136	740	11,396	100	11,396	14,749	40	28	
Sugar(Gur)	7,656	...	...	7,656	...	7,656	100	7,656	9,923	27	93	
Total											2,221	

TABLE CVI A

Village PALIKHURD 1960 - 61

Crops	Yield per acre in lb.
Rice unhusked	920
Maize	580
Big Millet (Sown alone)	540
Pulse (Moong)	240
Bulrush Millet	500
Sweet Potato	6400
Sugarcane (Gur)	2400
Wheat	820
Wheat & Barley	900
Wheat & Gram	820
Barley & Gram	980
Peas	980
Gram	820
Pulses	650
Potatoes	6400

TABLE:- CVI B

VILLAGE:- PALI KHURD

Population 384 (In lbs.) Years 1960-61

Commodity	Production	Export	Import	Available supply	Seed	Food (Gross)	Extraction Rate Percent.	Food (Net)	Per Head consumption Kg. per year	gm. per day	Calories per day	COMMENTS
Millet (Big)	38,437	...	...	38,437	427	38,010	95	36,109	42,654	117	401	48 percent of the total calorie intake per head per day is provided by the Kharif crops and 52 percent by the rabi crops. Millet and wheat together supply about two fifths of the total.
Millet (Bajrush)	405	...	...	405	2	403	95	383	0.453	1	3	
Maize	580	...	...	580	8	572	89	516	0.609	2	7	
Rice (Broad cast)	18,722	1872	...	16,850	1,628	15,222	66 2/3	10,148	11,987	33	118	
Pulse (Arher)	37,005	12,335	...	24,670	228	24,442	95	23,220	27,429	75	259	
Pulse (Moong)	478	...	...	478	4	474	95	450	0.531	2	7	
Sweet Potato	10,816	...	...	10,816	...	10,816	100	10,816	12,776	35	34	
Wheat	45,682	...	...	45,682	5,571	40,111	90	36,100	42,643	117	409	
Wheat and Barley.	7,773	...	...	7,773	864	6,912	80	5,530	6,531	18	61	
Wheat and gram	3,362	...	...	3,362	410	2,952	92	2,716	3,208	9	31	
Barley and gram	29,586	...	...	29,586	3,019	26,047	82	21,785	25,734	71	243	
Gram	22,214	...	...	22,214	2,167	20,047	95	19,045	22,496	62	214	
Peas	11,838	...	...	11,838	966	10,872	95	10, 328	12,201	33	114	
Potato	7,168	...	...	7,168	358	6,810	100	6, 810	8,004	22	15	
Sugar (Gur)	33,192	16,596	...	16,596	...	16,596	100	16, 596	19,602	54	190	
Total											2,106	

TABLE CVII A

Village SARUPPUR 1960 - 61

Crops	Yield per acre in lb.
Rice(Transplanted) unhusked	1640
Big Millet (Sown alone)	500
Bulrush Millet	450
Maize	500
Sweet Potato	6400
Sugarcane (Gur)	2000
Wheat	530
Barley & Gram	600
Wheat & Gram	530
Wheat & Barley	580
Barley	620
Peas	660
Gram	500
Pulses (Arhar)	350
Potatoes	6400

TABLE C VII B

VILLAGE:- SAMUPUR

Population 312 (XI 1b.) Year - 1960-61

Commodity	Production	Export	Import	Available Supply	Seed	Feed (Gross)	Extraction Rate pro-cent.	Feed (Net)	Per Head Consumption Kg. per Year	gm. per day	calories per day	COMMENTS
Millet (Big)	11,835	...	...8	11,838	142	11,693	95	11,108	16,099	44	151	55 percent of the total calorie per head per day is derived from the Kharif crops and 45 p.c. from the rabi crops. Sugar supplies about one-twelvth of the total intake while the remainder is obtained from cereals among which rice is more important and supplies more than one-third of the daily intake.
Millet(Balmush)	1,300	...	...	1,300	6	1,294	90	1,165	1,690	5	17	
Maize	1,595	...	...	1,595	26	1,569	89	1,396	2,022	6	22	
Rice	185,467	92,733	...	92,743	9,047	83,687	66 2/3	55,791	80,853	222	797	
Pulses	3,234	...	...	3,234	46	3,188	95	3,029	4, 389	12	41	
Sweet Potato	9,088	...	...	9,088	...	9,088	100	9,088	13, 168	37	36	
Wheat	18,534	...	...	18,534	3,497	15,037	90	13,533	19, 613	54	199	
Barley	1,128	...	...	1,128	182	946	70	662	0, 958	3	10	
Gram	14,580	...	...	14,580	2,333	12,247	95	11,635	16,862	46	159	
Wheat and Gram	19,584	...	...	19,584	3,698	15,889	92	14,619	21,183	58	201	
Wheat and Barley	4,238	...	...	4,238	439	3 ,499	80	2,799	4,054	11	38	
Gram and Barley	37,968	...	...	37,968	6,328	31,640	82	25, 945	37,601	103	352	
Peas	3,676	...	...	3,676	446	3,230	96	37,068	4,447	12	41	
Potato	5,312	...	...	5,312	332	4,980	100	4,980	7,217	20	14	
Sugar (Gur)	13,520	...	...	13,520	...	13,520	100	13,520	19,596	54	190	
Total:											2,258	

TABLE CVIII A

Village KUNWARPUR 1960 -61

Crops	Yield per acre in lb.
Rice (Transplanted) unhusked	1360
Big Millet	580
Bulrush Millet	500
Pulse (urd)	500
Maize	660
Sweet Potato	5600
Sugarcane	2400
Wheat	960
Wheat & Gram	960
Barley & Gram	980
Wheat & Barley	980
Gram	820
Peas	820
Pulses (Arhar)	580
Potatoes	6400

TABLE:- C VIII B

VILLAGE: K U N W A R P U R

Population 528 (IN lb.) YEAR: 1960-61

Commodity	Production	Export	Import	Available Supply	Seed	Food (Gross)	Extraction Rate Percent		Food (Net)	Per Head Consumption Kg. per Year	Gm. per day	Calories per day	Comments
Millet (Big)	41,255	10,314	...	30,941	427	30,514	95		28,988	24.903	68	233	43 percent of the total calorie intake per head is obtained from the Kharif crops and 57 percent from the rabi crops. Wheat alone provide more than one-fourth of the total intake, while rice supplies another one-eighth of the total.
Millet(Bulrush)	675	...	...	675	5	670	90		603	0.517	1	3	
Maize	165	...	...	165	8	157	89		140	0.119	0.3	1	
Rice	49,587	...	...	49587	2,917	47,470	66	2/3	31,780	27.301	75	259	
Pulses (Arhar&Urd)	39,532	7,906	...	31,626	376	31,250	95		29,687	25.504	70	242	
Sweet Potato	81,504	40,752	...	40,752	...	40,752	100		40,752	35.009	96	96	
Wheat	124,579	31,145	...	93,434	12,977	80,457	90		72,411	62.207	170	595	
Wheat &Gram	1,555	...	...	1,555	130	1,425	92		1,311	1.125	3	10	
Wheat &barley	15,406	...	...	15,406	1,572	13,834	80		11,067	9.506	26	89	
Barley and gram	33,800	...	...	33,800	3,159	30,641	82		25,126	21.585	59	202	
Gram	25,502	...	...	25,502	2,586	23,916	95		22,720	19.509	53	183	
Peas	16,220	...	...	16,220	1,582	14,638	95		13,906	11,859	33	113	
Potato	16,888	...	...	16,888	1,168	15,720	100		15,720	13.506	37	26	
Sugar (Gur)	8,664	...	...	8,664	...	8 ,664	100		8,664	7.441	20	70	
Total												2,132	

TABLE CIX A

Village BISAYAKPUR KACHHAR 1960-61

Crops	Yield per acre in lb.
Rice (Transplanted) unhusked	980
Pulse (Moong)	240
Barley	560
Barley & Peas	560
Peas	560
Wheat	480
Wheat & Barley	520
Sugar-cane (Gur)	2000

TABLE C.III B

VILLAGE Miseyak Pur Kachhar

Population 91 (In lb.) YEAR 1960-61

Commodity	Population	Export	Import	Available Supply	Seed	Food (Gross)	Extraction Rate Percent	Food (Net)	Per Head Consumption Kg. per year.	Gm. per day	Calories per day	COMMENTS.
Rice (Transplated)	617	...	4,200	4,817	50	4,767	66 2/3	3,178	15.846	43	154	34 percent of the total calorie intake per head per day is derived from the Kharif crops and66 by the rabi crops. Sugar alone supplies more than a fourth of the total intake, while the remainder is obtained from the cereals among which barley alone provides about two-fifths of the total.
Pulses	79	...	...	79	1	78	95	74	0.373	1	3	
Barley	27,350	...	...	27,350	3,907	23,443	70	16,410	81.802	224	744	
Barley and wheat	192	...	...	192	30	162	80	154	0.769	2	7	
Barley and Peas	4,409	...	...	4,409	573	3,836	82	3,146	15,681	43	146	
Peas	1,086	...	...	1,086	116	970	95	921	4.593	13	45	
Wheat	2,352	...	5,400	7,752	392	7,360	90	6,624	33.010	90	313	
Sugar(Gur)	10,140	...	...	10,140	...	10,140	100	10,140	50.538	138	484	
Total											1898	

NOTE: Available supply of 'Gur' is on the basis of one-fourth of the entire yield of cane, as it has been discussed in the foregoing pages that three-fourths of the cane is sold to the Sugar mill. Therefore three fourths of the production of cane has already been deducted from the entire yield.

TABLE CX A

Village AKBARPUR BIRBAL KACHHAR

1960-61

Crops	Yield per acre in lb.
Bulrush Millet	820
Pulses	820
Wheat	1230
Wheat & Gram	1230
Wheat & Barley	1230
Barley & Gram	1120
Gram	1000
Barley	1230

TABLE CX B

VILLAGE - AKBARPUR BIRBAL KACHHAR

(IN lbs.)

Population 796 Year 1960-61

Commodity	Production	Export	Import	Available supply	Seed	Food (Gross	Extraction Rate, Percent.	Food (Net)	Per Head Consumption			Comments
									Kg. per Year	gm. per day	Calories per day	
Millet(Bulrush)	9,528	...	...	9,528	23	9,505	90	8,555	4,676	13	45	3 percent of the total calorie
Pulse (Arhar)	3,198	...	...	3,198	16	3,182	95	3,023	1,722	5	17	intake per head per day is provided by
Wheat	385,851	154,340	...	231,511	31,170	200,341	90	180,307	102,747	281	983	the Kharif crops and 97percent by the
Barley	17,724	...	...	17,724	19,461	16,283	70	11,398	6,495	18	60	Rabi crops. Wheat alone supplies about
Gram	7,710	...	...	7,710	617	7,093	95	6,738	3,839	11	38	a little less than half of the total
Wheat & barley	18,967	...	...	18,967	1,542	17,425	80	13,940	7,943	21	72	intake, while the remainder is obtained
Wheat & gram	92,411	...	...	92,411	7,313	84,098	92	78,106	38,810	106	358	from other cereals among which wheat
Barley and gram	124,824	...	...	124,824	11,148	113,679	82	93,217	53,119	146	499	mixed with gram and barley mixed with gram are important.
Total											2,082	

TABLE CXI A

Village BAIJAMAU KACHHAR 1960-61

Crops	Yield per acre in lb.
Small Millet (Sawan)	320
" " (Kakun)	240
Maize	320
Barley & Gram	900
Wheat & Gram	820
Wheat	820
Wheat & Barley	900
Gram	820

TABLE CXI B
VILLAGE Baijnath Kachhar

Population 252 (In lbs.) Year 1960-61

Commodity	Production	Export	Import	Available Supply.	Seed	Food (Gross)	Extraction Rate Percent	Food (Net)	Per Head Consumption Kg. per Year	Gm. per day	Calories per day	COMMENTS.
Small Millets (Kakun)	979	...	...	979	12	967	95	919	1,655	5	17	Only 1 percent of the total calori intake per head per day is derived from the Kharif crops and 99 percent by the rabi crops. Barley mixed with gram and wheat mixed with gram supply about a half and more than two-fifths of the total respectively.
Small Millets (Sawan)	227	...	...	227	2	225	95	214	0.385	1	3	
Maize	140	...	...	140	4	136	89	139	0.250	1	3	
Wheat	9,282	...	...	9,282	1,132	8,150	90	7,335	13½ 167	36	128	
Gram	935	...	...	935	91	844	95	801	1. 440	4	14	
Wheat and barley	3,420	...	...	3,420	380	3,040	80	2,432	4. 373	12	41	
Wheat and gram	66,223	...	...	66, 223	8,078	58 ,387	92	53,695	96. 153	263	913	
Barley and gram	98,928	14,838	...	84, 090	10,992	73, 098	82	59,940	107.893	296	1,013	
Total											2,130	

TABLE CXII A

Village ILIASPUR 1960-61

Crops	Yield per acre in lb.
Big Millet	370
Bulrush Millet	450
Maize	410
Ground nuts	1500
Barley	780
Barley & Gram	[illegible]
Wheat & Gram	820
Wheat & Barley	710
Wheat	650
Peas	620
Pulses	410
Potatoes	5000

TABLE CXXI B
VILLAGE ILLASPUR
(Ill lb.)

Population 472 — Year 1960-61.

Commodity	Population	Export	Import	Available Supply	Seed	Feed (Gross)	Extraction rate Percent	Feed (Net)	Per Head Consumption Kg. per Year	Gm. per day	Calories per day	Comments.
Big Millet	2,708	...	14,400	17,108	44	16,064	95	15,261	14,423	40	137	20 percent of the total calorie intake per head per day is obtained from the Kharif crops and 80 percent from the rabi crops. Barley and barley mixed with gram together provide about a half of the total intake.
Bulrush Millet	9,333	...	...	9,333	41	9,292	90	8,363	8,025	22	77	
Maize	15,719	...	...	15,719	307	15,412	89	13,717	13,165	36	131	
Pluses	6,412	...	...	6,412	78	6,334	95	6,017	5,775	16	55	
Barley	93,296	...	...	93,296	9,569	83,727	70	58,609	56,225	154	511	
Wheat	22,295	...	...	22,295	3,430	18,865	90	16,979	16,297	45	158	
Barley and gram	33,480	...	43,200	76,680	3,254	73,414	82	60,200	57,854	159	553	
Wheat and gram	31,496	...	...	31,496	3,073	28,423	92	26,149	25,097	69	232	
Wheat and Barley	26,561	...	...	26,561	3,741	22,820	80	18,256	17,521	48	164	
Peas	254	...	...	254	25	229	95	218	0.209	1	3	
Potato	6,800	...	...	6,800	528	6,272	100	6,272	5,828	16	11	
Total											2,032	

TABLE CXIII A

Village PIAREYPUR 1960 - 61

Crops	Yield per acre in lb.
Big Millet (Sown Alone)	320
Bulrush Millet	320
Maize	600
Ground nuts	900
Barley	820
Barley & Gram	980
Wheat	740
Wheat & Gram	860
Wheat & Barley	800
Pulses	360
Potatoes	4800

TABLE :- CXIII B

VILLAGE: PIARKHUR

Population 211 (In lb.) YEAR :- 1960-61

Commodity	Production	Export	Import	Available Supply	Seed	Food (Gross)	Extraction Rate Percent	Food (Net)	Per Head Consumption Kg. per year	gm. per day	Calories per day	COMMENTS
Millet(Big)	12,675	...	...	12,675	238	12,437	95	11,815	25.431	70	240	34percent of the total calorie intake per head per day is provided by the Kharif crops and 66 percent by the rabi Crops.Maize alone supplies about three-tenths of the total intake,while the remainder is obtained from other cereals among which barley and gram is important, which provides little less than one-fourth of the daily intake.
Millet(Bulrush)	5,405	...	...	5,405	34	5,371	95	5,102	10.929	29	101	
Maize	35,098	...	...	35,098	375	35,723	80	29,650	63.654	174	632	
Pulse	18,504	9,252	...	9,252	206	9,046	95	8,594	18.450	51	176	
Wheat	4,433	...	...	4,433	580	3,853	90	3,468	7.440	20	70	
Barley	5,668	...	...	5,668	553	5,113	70	3,579	7.682	21	70	
Wheat and Barley	2,104	...	...	2,104	210	1,894	80	1,515	3.254	9	31	
Wheat and gram	22,876	4,575	...	18,301	2,128	16,173	92	14,879	31.943	88	305	
Barley and gram	73,422	36,711	...	36,711	5,994	30,717	82	25,188	54.076	148	506	
Potato	576	...	...	576	38	538	100	538	1.556	3	2	
Total :											2,133	

with

CXIII B

TABLE CXIV A

Village CHATURI-KA-PURWA 1960-61

Crops	Yield per acre in lb.
Rice(Broadcast) unhusked	1000
Big Millet	600
Small Millet (Sawan)	400
Maize	530
Sweet Potato	4800
Sugarcane (Gur)	2000
Wheat	660
Wheat & Gram	660
Barley	800
Barley & Gram	800
Gram	600
Peas	900
Pulses (Arhar)	720

TABLE CXIV B

VILLAGE: CHATURI KA PURWA (CHATURIPUR)

Population - 483 (N lb.) Year - 1960-61

Commodity	Production	Export	Import	Available supply	Seed	Food (Gross)	Extraction Rate Percent		Food (Net)	Per Head Consumption Kg. per year	gm. per day	calories per day	COMMENTS
Millet(big)	59,652	...	...	59,652	597	59,055	95		56,102	52.687	144	494	56 percent of tots calorific intake per head per day is obtained from the Kharif crops and 44 percent by the rabi crops . Big millet alone provides a little more than one-fourth of the tots intake. While the remainder is obtained from other cereals among which pulses wheat mixed with gram and barley mixed with gram are important.
Small Millet (Sawan)	348	...	...	348	3	345	95		328	0.306	1	3	
Maize	1,717	...	...	1,717	26	1,691	89		1,505	1.414	4	15	
Rice(Broadcast)	17,520	...	...	17,520	1,402	16,118	66	2/3	10,745	10.091	27	97	
Pulses	71,582	17,845	...	53,687	497	53,190	95		50,530	47.453	130	449	
Sweet Potato	480	...	...	480	...	480	100		480	0.451	1	1	
Wheat	7,510	...	...	7,510	910	6,600	90		5,940	5.578	15	53	
Barley	504	...	...	504	50	454	70		318	0.298	1	3	
Gram	4,056	...	...	4,056	406	3,650	95		3,468	3.257	9	31	
Wheat and Gram	42,610	...	...	42,610	5,165	37,445	92		34,449	32.352	89	309	
Barley and gram	50,104	...	...	50,104	5,010	45,094	82		36,977	34.727	95	325	
Peas	12,888	...	...	12,888	859	12,029	95		11,428	10.733	29	100	
Sugar (Gur)	860	...	...	860	...	860	100		860	0.808	2	7	
Total												1,887	

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M_A_P_S

Survey of India maps

1 inch to a mile: 54 N/10, 54 N/11, 54 N/12, 54 N/13, 54 N/14, 54 N/15 and 54 N/16

1 inch to a mile: 63 B/1, 63 B/2, 63 B/3, 63 B/4, 63 B/5, 63 B/7, 63 B/8 63 B/11 and 63 B/12.

1 inch to a mile: 63 C/1

1 inch to 4 miles: 54 N and 63 B.

A village road during the rainy season

Wasteland (Ravine)

Indigenous Irrigation Practice (swing basket, "Beri" system)

Modern Irrigation Practice (Tube well method)

A potato field

A paddy field adjacent to the settlement surrounded by a grove

A blossoming mustard crop

Digging of the groundnuts